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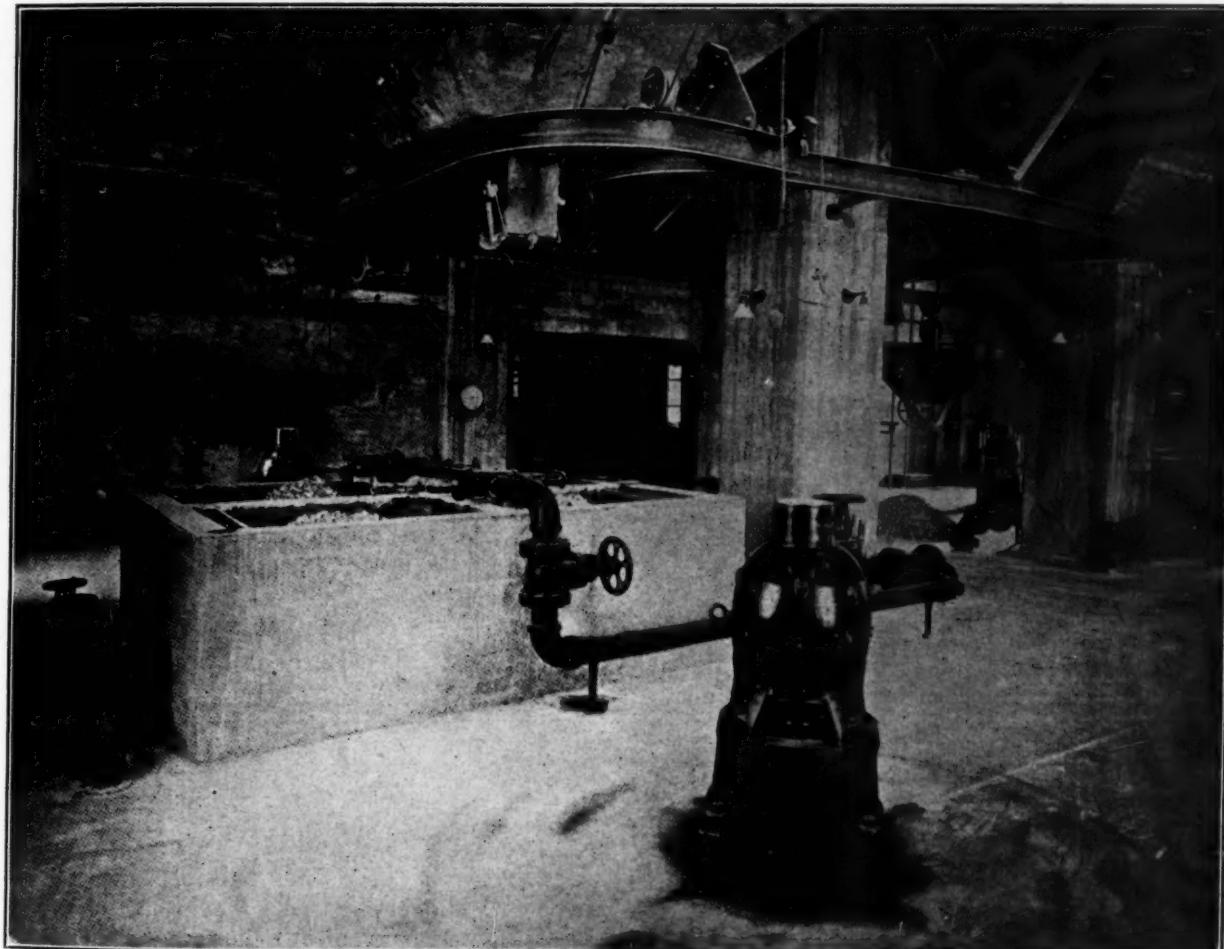
## OPERATION OF ST. LOUIS FILTERS

Report of the First Year's Operation of the Largest Rapid Filter Plant—Clarification by Precipitation—Operation Details and Costs—Unslakable Materials in the Lime—Difficulty of Piping Chlorine Water.

The report of the first year's operation of the new filtration plant at St. Louis is of unusual interest not only because of the size of the plant, but also because of the detail information which it gives concerning operation methods and difficulties encountered and overcome. The report is a credit to Water Commissioner Edward E. Wall and to Gurdon G. Black, engineer in charge; Aug. V. Graf, chemist, and C. M. Daily, assistant engineer and

The report ends with March 31, 1916, thus covering 10½ months' operation of the plant; but the balance of May is not included in most of the figures. During the ten months June to March, inclusive, the plant filtered 28,483 million gallons, an average of about 94 million gallons a day, or 2.34 million gallons per bed per day, with no allowance for time out for cleaning.

Since completion of construction some changes have



CHEMICAL ROOM, HEAD HOUSE, CHAIN OF ROCKS FILTERS, ST. LOUIS.

acting superintendent, respectively, of the Supply and Purifying Section.

By May 4th, 1915, the last of the forty filter beds which are comprised in this plant had been put into operation, and after a week's shut-down, to permit of completing some final details, the plant started up on May 13th, since which date all the water used in the city has been filtered.

been made in minor features which will be referred to later, and the grounds around the plant have been graded and planted. It is considered desirable to cover the clear-water basin to prevent algae growth and the entrance of dust and other impurities, a reinforced concrete slab roof on concrete columns, and covered with two feet of earth, being proposed.

## CLARIFICATION BY PRECIPITATION.

Lime and sulphate of iron have been used as coagulants at St. Louis for twelve years, the water being clarified in sedimentation basins. Last year the average quantities used were 5.57 grains of lime and 1.84 grains of sulphate of iron per gallon of water. The lime cost \$1.70 per million gallons and the iron \$1.42; while other costs at the old plant per million gallons were: Unloading chemicals, 8 cts.; operating, maintenance and repairs, 47 cts.; water, coal and oil, 3 cts.; light and power, 7 cts.; chemical work, 43 cts.; basin cleaning, 14 cts., and basin repairs, 3 cts.; a total of \$4.37 per million gallons. Most of the time the lime was added just as the water entered the first division of the mixing conduits (grit chambers having previously removed an average of 29.2% of the suspended matter in the raw water), through which conduits it traveled at a rate of 3.3 feet per second or less, depending upon the rate of pumping. The sulphate of iron was added, as a rule, as the water left the second division, but trials were made of adding it before the lime was applied and also after the water left the mixing conduit on its way to the basins. The period of mixing averaged an hour.



MISSISSIPPI RIVER WATER.  
Before purification. After purification.

"This mixing not only tends to hasten the completion of the reaction of the lime with the bicarbonate of the river water, but also tends to cause the more rapid subsidence of the precipitated calcium carbonate and magnesium hydroxide with the iron hydroxide when the water enters the basins. For twenty-eight days no sulphate of iron was used in the treatment of the water. During this time the turbidity of the water entering the mixing chamber was as high as 320 parts per million. The increase in size and character of the matter removed from solution by the lime, making the use of sulphate unnecessary, is to be credited to the agitation accomplished in the mixing chamber."

During the year 34,690.4 million gallons of water were pumped into the basins, and from this was removed 285,709 tons of suspended matter and 9,035 tons of dissolved matter, 27,084 tons of coagulants being used. The sulphate of iron, in the form of sugar sulphate, was furnished by the American Steel and Wire Company at \$10 per ton. Lime cost \$3.65 per ton, the specifications requiring 85% CaO, with a bonus and penalty of 1½% of the contract price for each per cent of CaO above or below this. During the past year the CaO has averaged 84.1%, ranging from 81.8 to 86.7.

The complete purification system was not in use until October 11th, when the grit chamber and mixing cham-

ber were put into service. For the period following November 1st an average of 5.21 grains of lime and 0.83 grains of iron were used per gallon, a reduction by 60% in the amount of iron used during the corresponding period of the previous year. The reason why this reduction was possible has already been explained.

## FILTERING CLARIFIED WATER.

The water so clarified is then delivered to the new filtration plant, where it receives aluminum sulphate and liquid chlorine, the former costing \$1.00 per million gallons treated and the latter 15 cts.; while the other expenses connected with the filtration plant averaged 98 cts. for operating, maintenance and repairs; 26 cts. for coal, miscellaneous supplies and expenses, and 15 cts. for light and power, a total of \$2.54 per million gallons.

Before entering the filters the water received a charge of aluminum sulphate, and in addition most of it received slight additional charges at both ends of the plant. In addition, a small charge was added after washing to the water above the filter to hasten the formation of a "schmutzdecke." (This will be discussed later.) The sulphate of alumina used averaged 0.58 grain in the basin and 0.16 grain in the influent flume, while an average of 14 pounds was used on each filter bed after each wash, averaging 0.162 grains per gallon filtered. In addition, an average of 1.96 pound of chlorine was used per million gallons.

The sulphate of alumina was furnished by the General Chemical Company at \$16.80 per ton under specifications calling for at least 17% of available water-soluble alumina; at least 0.5% of alumina in excess of the amount theoretically required to combine with the sulphuric acid present; not more than 0.1% of matter insoluble in cold water, and not more than 1% of iron. The liquid chlorine was furnished by the Electro Bleaching Gas Co., first at 10 cts. and later at 8 cts. a pound, delivered in cylinders containing 100 pounds of liquid.

Certain details of the operation of the filter plant during the ten months (all averages) are as follows: Rate per day, 2.35 million gallons per filter. Number of washings, 283 during the ten months. Amount filtered per wash, 2.52 million gallons. Water used per wash, 49,200 gallons (varying from 75,000 to 26,000). Amount of filtered water used for washing, 1.95%, the monthly averages varying from 0.98% to 2.41%. The turbidity of the applied water averaged 20, varying from 98 to 4; that of the filtered water averaged 0.32, varying from 3 to 0. (The turbidity of the raw water averaged 1420.) The color of the applied water averaged 20.9 and that of the filtered water 15.4.

The costs for the filtration plant were as follows: Aluminum sulphate, \$23,733.50. Chlorine, \$4,830.78. Operation and maintenance, \$37,276.49. Other expenses, \$1,587.24. Total cost, \$67,448; or, as 27,264 million gallons were filtered, the cost averaged \$2.47 per million gallons. The monthly averages of costs (omitting the first month) varied from \$2.16 to \$3.11 per million gallons, the former being in October, the later in February.

The operating force consisted of four shifts of six men each, three shifts being on regular 8-hour watches, and the extra shift, on duty during the day, doing all repair and maintenance work. Each regular shift comprised an assistant superintendent, filter operator, filter attendant and gatekeeper in the filter house, an attendant in the pump pit and around the switchboard, and an attendant to mix the chemical solutions and care for the ice making plant. In winter a fireman was added to each shift. In addition, a mechanic and helper, an extra gatekeeper, a clerk, and the superintendent were on duty during the day, and an electrician was on duty part of the time. The average monthly pay roll during the win-

ter was \$2,414. The cost for the fiscal year for the chemical laboratory was \$14,029 and for chemicals used \$131,630, both applying to settling basins as well as to the filters.

#### DETAILS OF OPERATIONS.

Some of the more interesting details of operation and difficulties encountered are described below:

**Lime Troubles.** As the per cent of CaO in the lime used decreases, the troubles with the slaking and heating tanks increase. Some of the lime had as much as 20% of unburned limestone and 10 to 20% of other inert matter. From 5.3% to 9.5% of the lime added remained in the slaking tanks, this residue being composed principally of coarse sand, gravel and unburned lime. If the power goes off after a slaking tank has been in use for over eight hours there is danger of twisting the shaft carrying the agitators when starting the mixing tank.

The heater tanks also have suffered from the unslakable material. A set of new copper coils costing \$193 lasted just six weeks in a heater tank, as the swiftly whirling sand and gravel eroded the coils in many places. Iron coils costing \$80 a set were substituted and, although thinner, had been in use over two months without showing an appreciable sign of wear. It was expected that the water supplying the head tank would not be as hot as when the copper coils were in use, but tests showed no advantage of copper coils over iron ones in this respect.

The greater part of the unslakable material is carried over from the slaking tank through the heater tank into the pump box, and some settles here, but the greater part is carried with the milk of lime to the mixing chamber, some being deposited here while the remainder is carried to the basins, from which it must be flushed.

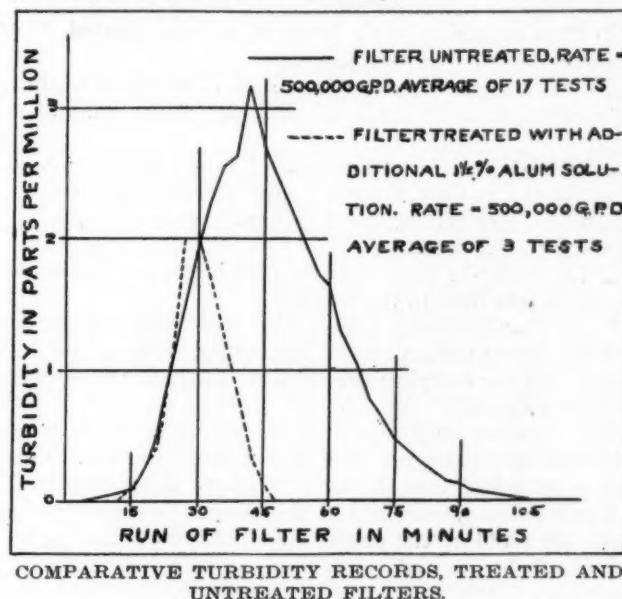
"Lime for water softening should be of the highest grade obtainable. Our specifications for lime should require a lime of 88 per cent CaO, with a bonus of 1½ per cent of the contract price for each 1 per cent of CaO above the required 88 per cent, and a penalty of 1½ per cent for each 1 per cent of CaO below the required 88 per cent for lime containing over 80 per cent CaO, and a penalty of 3 per cent for each 1 per cent less than 80 per cent of CaO."

**Washing Filters.** When the filter plant was first put into operation several problems required experimental solution. The first was to determine how much filtered water should be wasted after washing. The turbidity of the effluent was measured every three minutes at various rates of filtration without wasting any of the effluent, and it was found that the half-million gallon rate, the lowest at which it was possible to control, gave the best results. Running at this rate, the effluent was clear, became turbid for a time, and then became clear again, with a probable average of 5,000 gallons of clear water and over 18,000 turbid. Dry aluminum sulphate was added to the water in the central gutter when filling the bed after washing. One, two, and three grains per gallon of water remaining above the sand were tried, and the second amount gave the best result, being 14 pounds per bed.

When this was added after washing, the turbidity during the turbid period seldom exceeded 1 part per million and was often as low as ¼ part. The average amount of effluent running clear immediately after washing was about 4,500 gallons and the turbid flow amounted to 11,000 gallons. The time after washing until running clear varied from forty to fifty minutes, and after this time the rate could be raised to any amount up to 5 million gallons daily (the highest rate which has been run) and the effluent remain clear. The immediate increase in loss of head after raising the rate varied from 1 to 3.5 feet.

As a result of these experiments, fourteen pounds of

dry aluminum sulphate is put in the central gutter as the bed is filled after washing, no effluent is wasted, the filter is run for one hour at the half-million-gallon rate and then raised to the required rate. It was proposed to arrange for adding the aluminum sulphate as a solution, which would act more quickly and effectively than the solid. The accompanying plot shows the turbidity obtained on filters, both treated and untreated. (Filters to which aluminum sulphate is applied after washing are termed "treated.") The turbidity determinations were made after washing and the run of filter in minutes shows the turbid period of the effluent after the filter is put back into service. It will be seen that the turbid period of the treated filter is short compared to that of the untreated, and that the amount of turbidity is less. Bacterial samples were taken at the same time, and these always showed the highest bacterial content at the highest turbidity and the lowest at the lowest turbidity.



COMPARATIVE TURBIDITY RECORDS, TREATED AND UNTREATED FILTERS.

Another problem was the quantity of water to be used for washing and the rate of application. At first the rate was limited to 18 inches vertical rise per minute, amounting to 16,700 gallons per minute, the washing being continued until clear patches of water appeared on the surface. A smaller amount at a higher rate was found to accomplish the same results, and now a maximum of 24 inches, or 21,000 gallons per minute is allowed. The rate of washing as developed thus far is from 3 to 6 inches per minute until the bed is broken, then being raised to from 21 to 24 inches per minute and continued until clear patches of water cover about half of the bed.

As a matter of economy, the filter beds are drained to within four inches of the sand before being taken out of service for washing. This depth has been found to be sufficient to prevent the film from breaking up, due to the air imprisoned in the underdrains and lower strata of the filtering material, which collects in large quantities, especially in cold weather due to the increase in pressure.

Filters have, during the year, been run between washings from 8½ to 112 hours, averaging 29½ hours; and from 650,000 to 10,500,000 gallons, averaging 2,740,000 gallons.

**Bacteria Removal.** The per cent removal of the total number of twenty-degree bacteria was 99.4, and of the thirty-seven-degree bacteria was 99.8. These figures include the one and one-half months previous to the operation of the filter plant. The averages for the year, 20° on gelatine, were: river water, 51,206 per c.c.; applied to filters, 1,118; filtered, 637; delivered to mains, 317. The

last varied from 33 in August to 1,089 in February. The number of B. Coli averaged 31 in river water, 0.2419 as applied to the filter, 0.1025 in filtered water, 0.0214 as delivered to mains, and 0.0121 as delivered to consumers.

The effective size of the sand used in the several filters varied from 0.30 to 0.47 mm., eleven filters having an effective size of from 0.32 to 0.33, seven between 0.34 and 0.35, and only two more than 0.41 mm. An analysis of the figures for the year with reference to the forty filters shows that

1. The bacterial efficiency of a filter bears no relation to the effective size of the sand therein.

2. The number of bacteria in the sample collected one-half hour after raising the rate is less than in the samples collected one-half hour after washing. (After washing, the water was run through at a half-million-gallon rate for forty to fifty minutes, and then the rate was raised to the regular filtration rate.)

3. This reduction is far greater in the treated filter samples than in the untreated.

4. The samples collected one-half hour after washing show approximately the same bacterial count and B. Coli content.

5. In both treated and untreated filters there is an increase in the B. Coli content in the samples collected one-half hour after raising the rate over those collected one-half hour after washing.

6. The increase in B. Coli content is greater in the untreated filters than in the treated.

*Pipes For Carrying Chemicals.* The chlorine meters and dissolving towers are on the second floor of the head house, and for carrying the chlorine water to the drawing conduit chamber, 1½-inch hard rubber pipe led it to a 4-inch vitrified clay pipe laid in concrete which had a minimum thickness of 3½ inches around the tile. From this pipe three lines of 2-inch brewery hose extended a few feet below the surface of the water. On first starting, leaks occurred at the connections of the rubber pipe to the vitrified pipe and were repaired with litharge. In a few days leaks developed all along the vitrified pipe, which was about three feet below the surface of the ground, scarcely any of the chlorine water reaching the end of the line. All the concrete was rotten where the chlorine water came in contact with it. A 2-inch brewery hose was run through the line of vitrified pipe, couplings being made with hard rubber pipe with litharge, and no further trouble has been experienced.

The aluminum sulphate solution used varies from 1 to 3 per cent. It is pumped from the solution tanks in the head house to orifice boxes through lines of pipe, for which there was used at first 8-inch vitrified pipe surrounded with concrete with a minimum thickness of 3 inches; while 4-inch fiber pipe was used for connections to orifice boxes and meters and from these to the points of application. When these lines were tested leaks developed along the entire length of approximately 850 ft., none of the 200 gallons a minute which was being pumped reaching the orifice boxes, which were 30 ft. above the lowest part of the line and 15 ft. above the level of the solution in the tanks. First one section and then another was removed and relaid with the greatest care, but still a large percentage of the water escaped. A 2½-inch fire hose was used as a temporary line, but the 4-inch fiber pipe broke during the first day's use under a head of less than 15 feet; and when replaced with similar pipe this became soft and liquid oozed through the walls. Finally the 8-inch vitrified pipe and 4-inch fiber pipe were replaced by 4-inch 8-pound lead pipe in 20-foot lengths, the lengths being connected by cast iron flanges, through which the pipes were run and peened over, thus forming lead gaskets.

The 3-inch chemical pumps of vanadium victor silver

metal were badly corroded by the aluminum sulphate solution, and it was necessary to replace the labyrinth rings, and the impeller wheel was reduced in thickness.

## GARBAGE REDUCTION PLANT FOR NEW YORK CITY

### To be the Largest Reduction Plant in the World, with Capacity of Two Thousand Tons a Day—Details of Construction.

The city of New York has contracted with a specially formed company for disposing of its garbage by a utilization process, the plant to be located on an island in Richmond borough. The citizens of the borough are using every effort to prevent the locating of the plant there, and for the present actual construction work is at a standstill. We understand, however, that the shop work on the apparatus has not been interrupted.

This plant is to have a capacity of two thousand tons of garbage a day; the amount at present collected averaging 1,300 tons, with a maximum daily collection of about 1,600 tons; and the amount is increasing at the rate of about 2½ per cent. It will be the largest reduction plant in the world, and will contain the latest improvements in that process. Every effort and device has been employed to insure sanitary and inoffensive operation.

This plant was described by Gustave R. Tuska, consulting engineer of New York, in a paper before the American Society of Municipal Improvements on October 11th; and the information contained therein is abstracted below.

The process to be used is that known as the "Cobwell." As we have already described this quite thoroughly as it is used in Los Angeles (see Municipal Journal for June 10th, 1915), we will omit Mr. Tuska's description of the general process. Following such description he calls attention to the fact that if there are any leakages or vents in any of the tanks or piping where the solvent is handled, more or less of the solvent is lost and thereby a substantial additional expense is imposed upon the operation of the system. Furthermore, under this system, the garbage is at no time brought in contact with the atmosphere, from the time of its original entrance into the reducer until, after over twelve hours of cooking, it is finally discharged therefrom as finished products, dried, sterile and practically odorless. These finished products are grease and the tankage above referred to.

The process is one of straight de-hydration, and from the time that the material is at the boiling point, no further chemical action in it takes place. No "digestion" occurs, and therefore the odors and gases incidental to such a process are not created. Only the gas contained in the raw material is driven out, and only the essential oils of an extremely volatile nature are carried over in the current of steam and solvent vapor evolved. That little or no conversion takes place in the operation is shown by the fact that in the dehydrated material obtained at the end of the operation, there exists practically the same amount of unconverted starchy bodies as existed in the garbage at the time of its entrance into the reducer. The water condensed contains all the gases evolved and has, when fresh, a slight odor of the mixed essential oils. Some traces of alcohol are detected in the effluent and a very small quantity of fixed oils is carried over. Any ammonia evolved, if it has escaped the acid in the garbage, is neutralized by acid carried over in the vapor. Whatever albuminoid ammonia exists in the effluent is carried over by mechanical entrainment as dust particles during the period of the steaming out of the solvent.

*Effluent.* The effluent consists of practically nothing but water, being the condensed moisture drawn from the reducer while the garbage is being treated and from which the solvent has been extracted as completely as possible. An analysis of undiluted effluent from the New Bedford plant, where this process is used, gave, in parts per million: acidity calculated as acetic acid, 500; total solids, 1,000; oxide of iron (included in the total solids), 530; total nitrogen as ammonia, 31; albumoid ammonia, 1.2; fixed and volatile oils, 59; organic solids, 330. The effluent, after exposure to sun and air for thirty days, gave no evidence of putridity, but had a slight vinegar-like odor. When flowing from the separating tanks it had a slight sweetish acid odor; but was cold, gave off no vapor, and the odor was perceptible only two or three feet away.

There is about 1,400 pounds of effluent per ton of garbage; so that when New York is contributing 2,000 tons a day the effluent from this will contain 2,800 pounds of total solids, of which 86 pounds is ammonia and 944 pounds is organic solids. These figures are based on undiluted effluent, or the actual water from the garbage. In this plant jet condensers will be used, and twenty times as much cooling water will be added to the garbage water; and the actual effluent from the plant will have but one-tenth to one-twentieth as much of the contained materials as indicated above.

*Odors.* The only other source of odor would be the air and gases mechanically included in the green garbage prior to its entrance into the reducer, which are driven out by the first rush of solvent vapor. The only outlet for these gases is a small vent on the solvent storage tank. The only odor detected from such vents in existing plants is one of petroleum, which destroys or masks the other odors. When the tankage is taken from the reducer it is dry and warm and there is momentarily a slight odor similar to that of stale gingerbread, due to the essential oils rising from the material while hot. This odor lasts only during the dumping and is not perceptible outside the building.

#### DESCRIPTION OF THIS PLANT.

At this plant the garbage will be delivered in barges, so constructed that all water drained from the garbage in transit will be collected in a special closed tank located at one end of the barge. On the arrival of the barge at the plant, these tanks will be automatically emptied by attaching a steam connection thereto and by means of the steam pressure blowing the drained water to tanks on shore; the steam also disinfecting the tanks. While in transit the barges will be covered by specially treated waterproof canvas covers so attached as to prevent the escape of any of the garbage from the barges. A canvas apron will extend from the barge to the dock to prevent any of the garbage falling into the water during the unloading of the barge.

The garbage will be unloaded from the barges by two steam-operated hoists, equipped with grab buckets. These grab buckets will deliver the garbage to closed conveyors of the steel scraper type which will convey the material to the reducers, located in the main building.

This main building is 200 ft. by 330 ft. and about 30 feet high, and of one story. It contains the reducers, 250 in number, with the necessary conveyors (all of which will be of closed type) for the raw garbage and for the dried tankage; also the piping for steam and solvent and the transmission machinery. The capacity of each reducer unit is from 8 to 10 tons of raw garbage per 24 hours, depending on the steam pressure employed. In the New Bedford and Los Angeles plants the capacity

obtained from one unit is 8 tons per 24 hours, with a steam pressure of 70 lbs., but in this plant the steam pressure will be 150 lbs., giving a temperature for dehydratation from 320° F. to 360° F., thereby increasing the capacity of the reducer. An increase in the capacity has also been obtained by using a different solvent. In other plants using this process gasoline is employed, but in this plant there will be used a special solvent, a kerosene distillate obtained by use of a vacuum still, which distillate will be made at the works. A further economy will be obtained by so designing the circulating system as to return condensed water at 360° F. to the boilers.

Heretofore only surface condensers have been employed in the plants using this process, but after a considerable amount of experimental work with jet condensers, it has been proven that the latter are more satisfactory as well as more economical. It has therefore been decided to use the jet type of condenser in this plant.

The grease with the distillate is piped from the main building to the stills, which are of the vacuum type, and the distillate there taken from the grease, condensed and delivered to solvent storage tanks of 400,000 gals. capacity, and the grease is delivered to other storage tanks of 14,000 barrel capacity. The grease building where this work is done is 100 ft. long by 100 ft. wide and 25 ft. high.

The dried tankage is conveyed by belt conveyors from the main building to the grinding and screening building. Pan mills and rotary screens are employed. From the screening building the tankage is conveyed to the storage building which is 100 ft. long by 100 ft. wide and 40 ft. high. The material is distributed throughout this building by screw conveyors. Two tunnels will be built through this building containing belt conveyors to automatically convey the stored material to the loading vessel through swivel spouts.

The boiler house with an engine-room extension will be 140 ft. long by 50 ft. wide and 65 ft. high. Water tube boilers with automatic underfeed stokers will be used with a productive capacity of 7,500 boiler horse power. There will also be a machinery building 30 ft. by 160 ft. by 25 ft. containing pumps of a capacity of 21,000 gals. per minute. Also boiler, blacksmith, machine and pattern shops, storeroom, etc. There will also be constructed the necessary administration building, mechanics, dormitory building, etc., etc.

The estimated cost of this plant when completed for a capacity of 2,000 tons of garbage per 24 hours is three million dollars, the main items of which are as follows:

Buildings	.....	\$500,000
Boiler plant, including concrete stack	.....	190,000
Reducer units, including condenser, still and auxiliary equipment at \$7,000 each for 250	.....	1,750,000
Piping	.....	250,000
Conveyors	.....	125,000

From the above it will be seen that this plant figures out a total cost for construction of about \$1,500 per ton of garbage per day. The cost of a plant of similar size, operating by the digestor or Arnold system, will figure out about \$1,000 to \$1,200 per ton of raw garbage per day. It is therefore evident that a plant operating on this process is from 25 to 50 per cent more expensive than one on the digestor system. The cost of operation per ton of garbage by this system is also considerably higher than by the digestor system, the labor cost being about the same, but the cost for fuel and solvent being considerably greater.

As against this increased cost, we have superior sanitary advantages and a considerably greater value of recovered products. By the use of this process a larger grease recovery is obtained, also a more valuable tankage. When the digestor system is employed, the potash contained in the vegetable fibre, being soluble, is lost in the

discharged water. With this process it remains in the tankage and amounts to over 1% by weight in the dried product.

Furthermore, with the digestor system the largest portion of the water contained in the garbage is removed by pressing. This water discharged from the presses carries 8% of solids by weight, and it is most valuable for fertilizer purposes as it contains all the ammonia and potash which is water soluble. All such material is recovered by the "Cobwell" process. Also, where direct-heat dryers are used there results a large loss of solids (tankage, grease and fibrous material), averaging about 20% of the total weight of tankage fed into the dryer, due to car-

bonization of the materials named, which causes various odors and gases. This loss, with the resultant gases, is avoided by the process to be used in this plant.

#### FIRE DEPARTMENT DATA.

Information concerning the fire departments of more than seven hundred cities was collected by Municipal Journal a few weeks ago, and most of it has already been published in tabulated form. We are presenting the remainder in this and next week's issues, and in connection with the latter will give a summary of this table and a discussion of certain groups of figures.

#### GENERAL INFORMATION CONCERNING FIRE DEPARTMENTS.

City	Population	Latest approp-	Built-up area protected, sq. miles	No. of buildings in protected area	Area of congested value district, sq. miles	First alarm area for	
						horse apparatus, sq. miles	motor apparatus, sq. miles
<b>Alabama:</b>							
Birmingham	175,000	\$135,721	48	.....	1	1/2	1
Enterprise	3,500	.....	.....	.....	.....	.....	.....
Mobile	51,521	75,000	13	12,600	.....	.....	1/2
Tuscaloosa	8,456	5,220	4	.....	12 blocks	4	.....
Tuskegee	2,800	.....	1/4	.....	.....	.....	.....
Union Springs	4,700	.....	1 1/2	.....	.....	5 to 10 blocks	.....
<b>Arizona:</b>							
Bisbee	16,000	9,800	4	.....	2	.....	.....
Douglas	13,000	.....	.....	.....	.....	.....	.....
Nogales	.....	6,250	.....	.....	.....	.....	.....
Phoenix	25,000	32,440	4.35	5,300	24 blocks	.....	1
Prescott	5,000	.....	.....	.....	.....	.....	.....
<b>Arkansas:</b>							
El Dorado	6,000	.....	.....	.....	.....	.....	.....
Helena	8,000	13,000	1	2,000	.....	whole city	.....
Hot Springs	20,000	.....	.....	.....	.....	.....	.....
Jonesboro	10,000	.....	.....	.....	.....	.....	.....
Little Rock	65,000	88,894	20	.....	3/4	1	2
Morrillton	2,500	.....	.....	.....	.....	whole city	.....
Paragould	7,500	.....	.....	.....	.....	.....	.....
Pine Bluff	25,000	.....	.....	.....	.....	.....	.....
Prescott	3,000	.....	.....	.....	.....	.....	.....
Siloam Springs	3,500	500	1/2	800	.....	1/2	.....
<b>California:</b>							
Alameda	31,000	41,652	5	6,900	0.4	3/4	1
Alhambra	9,000	12,000	.....	18,000	1/2	2	3 to 10 blocks
Anaheim	5,500	720 <sup>1</sup>	.....	1,000	1	2	.....
Bakersfield	18,000	32,000	9	.....	7 blocks	.....	.....
Glendale	8,000	.....	6	.....	.....	.....	.....
Hanford	7,000	4,400	.....	.....	.....	.....	.....
Hayward	4,000	1,440	.....	.....	.....	.....	.....
Long Beach	42,000	41,437	.....	.....	.....	.....	.....
Los Angeles	535,000	875,256	.....	.....	.....	.....	.....
Monrovia	5,500	3,250	9	500	1/2	.....	9
Napa	7,000	11,000	4	.....	1/2	.....	all
Oakland	250,000	404,000	58	.....	.....	2	1 1/2
Oxnard	4,000	.....	.....	.....	.....	.....	.....
Pasadena	47,000	63,000	11.5	.....	1/2	.....	.....
Petaluma	8,000	9,000	3	.....	1	2	.....
Redlands	11,000	4,500	.....	.....	16 blocks	3	.....
Richmond	22,000	20,000	29	.....	1	.....	.....
Riverside	20,000	16,212	40	.....	0.1	whole city	all <sup>2</sup>
San Leandro	5,500	1,500	1	1,000	.....	2	.....
San Luis Obispo	6,000	4,500	4	.....	.....	all	.....
San Rafael	6,500	6,464	all	.....	20 blocks	1/2	.....
Santa Ana	15,000	.....	7	.....	0.1	all	2
Santa Barbara	20,000	7,100	.....	.....	.....	all	1 1/2
Santa Monica	15,300	13,000	6 1/2	4,600	1 1/2	2	1 1/2
Santa Rosa	13,500	7,340	.....	.....	.....	all	.....
Stockton	42,500	75,233	2	.....	.....	all	.....
Vallejo	15,000	9,722	4	3,500	8 blocks	.....	.....
Ventura	4,000	1,000	4	1,000	.....	.....	.....
Whittier	7,000	.....	.....	.....	.....	.....	.....
<b>Colorado:</b>							
Canon	8,000	2,800	.....	.....	1	.....	2
Colorado Springs	30,000	50,872	8	7,866	1/4	.....	4
Durango	5,000	5,000	.....	.....	14 blocks	.....	.....
Grand Junction	8,000	.....	.....	.....	.....	.....	.....
La Junta	7,000	1,634	.....	.....	.....	2-3	1
Leadville	10,000	3,600	.....	5,000	6 blocks	1	.....
Longmont	6,000	1	1,400	.....	25 acres	.....	.....
Pueblo	60,000	61,500	13	1,200	120 blocks	all	all
Salida	5,000	3,325	2 1/4	.....	12 blocks	.....	.....
Trinidad	15,000	.....	.....	.....	.....	.....	.....
<b>Connecticut:</b>							
Ansonia	15,000	5,100	.....	.....	.....	.....	.....
Danielson	3,000	.....	.....	.....	.....	.....	.....
Greenwich	16,500	.....	.....	.....	.....	.....	.....
Hartford	115,000	268,250	.....	20,000	.....	.....	.....
Middletown	13,000	12,000	.....	.....	.....	.....	.....
New Britain	56,000	53,900	10	5,500	1/4	1 1/2	whole city
Norwalk	26,000	23,989	.....	5,300	.....	1	1 1/2
Norwich	30,000	35,500	26.3	5,000	1/2	1	1 1/2
Stamford	34,000	55,400	.....	4,775	1/2	.....	.....
Suffield	4,000	.....	200	.....	.....	.....	.....
Thomaston	6,500	.....	4,000	.....	.....	.....	.....
Thompsonville	12,000	.....	.....	.....	.....	.....	.....
Wallingford	13,900	4,000	.....	500	.....	.....	.....
Windsor	3,000	.....	.....	.....	.....	.....	.....

For footnotes, see page 572.

## GENERAL INFORMATION CONCERNING FIRE DEPARTMENTS—Continued.

City	Population	Latest ap- propriation	Built-up area protected, sq. miles	No. of buildings in protected area	Area of congested value district, sq. miles	First alarm area for	
						horse apparatus, sq. miles	motor apparatus, sq. miles
<b>District of Columbia:</b>							
Washington	360,000	705,030	69.2	.....	.....	.....	.....
<b>Florida:</b>							
Daytona	6,000	5,000	3/5	3,000	1/2	.....	all
Ft. Myer	5,000	4,000	.....	.....	.....	.....	all
Gainesville	10,000	4,000	.....	.....	14 blocks	2	1
Jacksonville	60,000	138,211	10	.....	2	.....	2 1/2
Key West	18,000	27,000	1	5,141	1/2	.....	1/4
Lakeland	9,000	2,000	1	.....	1/2	.....	1/4
Miami	20,000	.....	.....	.....	.....	.....	.....
Ocala	6,000	5,500	.....	.....	.....	.....	.....
St. Petersburg	10,000	.....	.....	.....	8 blocks	.....	9 blocks
Sarasota	2,500	.....	.....	.....	.....	.....	all
Tampa	65,000	75,000	12.2	.....	1/2	.....	.....
<b>Georgia:</b>							
Albany	13,000	15,000	.....	.....	.....	.....	.....
Americus	10,000	.....	.....	4,200	.....	.....	.....
Augusta	55,000	77,000	9.75	.....	16 blocks	.....	1
Brunswick	12,600	9,000	10	.....	.....	.....	whole city
Cedartown	5,000	650	.....	2,000	.....	.....	whole city
Columbus	25,000	36,000	.....	.....	.....	.....	.....
Dawson	3,800	.....	4	.....	.....	.....	.....
Douglas	5,500	.....	2	800	.....	.....	.....
Elberton	7,000	.....	.....	.....	.....	.....	.....
Macon	50,000	.....	.....	.....	.....	.....	.....
Thomasville	8,000	.....	.....	2,000	.....	.....	.....
<b>Idaho:</b>							
Boise	25,000	48,000	.....	.....	.....	.....	.....
Idaho Falls	7,000	6,000	.....	1,800	0.8	.....	.....
Lewiston	7,500	5,042	.....	.....	.....	.....	5 1/4
Nampa	5,000	3,500	2	.....	1/2	whole city	whole city
Sand Point	3,000	2,200	1	.....	8 blocks	whole city	whole city
<b>Illinois:</b>							
Aurora	38,000	38,997	7	.....	1	.....	4
Belleville	25,000	.....	.....	5,000	.....	.....	whole city
Belvidere	8,000	9,250	.....	.....	4	1	2
Bloomington	28,000	34,000	.....	.....	.....	.....	.....
Canton	13,500	8,400	.....	.....	.....	.....	.....
Carterville	4,000	1,000	.....	.....	.....	.....	.....
Centralia	11,000	.....	.....	.....	.....	.....	.....
Charleston	18,000	4,500	.....	.....	.....	.....	.....
Chester	3,000	.....	.....	.....	.....	.....	.....
Chicago Heights	20,000	19,093	4.25	3,000	4 blocks	1/2 <sup>5</sup>	all
Cicero	35,000	.....	.....	.....	.....	1	3
Decatur	41,000	46,000	6	10,561	24 blocks	.....	.....
Downer's Grove	3,500	200	.....	500	.....	.....	.....
E. Moline	10,000	.....	.....	.....	.....	2	.....
E. St. Louis	80,000	95,000	.....	.....	40 blocks	.....	.....
Edwardsville	7,500	10,000	.....	.....	.....	all	.....
Elgin	27,000	31,092	.....	9,000	1	3	3
Fairbury	2,500	.....	500	.....	.....	.....	.....
Fairfield	3,000	750	.....	.....	.....	.....	.....
Forest Park	10,000	4,000	.....	.....	.....	.....	.....
Harrisburg	12,000	.....	.....	.....	.....	.....	.....
Highland Park	9,000	2,000	.....	1,200	.....	.....	1
Jacksonville	17,000	.....	.....	.....	.....	.....	.....
Joliet	38,000	44,000	6	.....	2 1/2	.....	4
Kewanee	15,000	10,000	4	.....	1/4	.....	all
Lincoln	12,000	.....	.....	.....	.....	2	.....
Marshall	2,600	.....	.....	.....	.....	.....	.....
Mattoon	15,000	13,000	4	.....	.....	.....	.....
Mendota	5,000	1,400	1	.....	.....	all	.....
Moline	30,000	30,137	.....	.....	64 blocks	.....	.....
Morris	5,000	500	2	.....	.....	all	.....
Mt. Vernon	11,000	.....	.....	.....	.....	.....	.....
Murphysboro	12,500	4,500	.....	.....	.....	3 1/2	.....
Napierville	5,000	2,000	140 blocks	1,760	14 blocks	14 blocks	8 blocks
Normal	4,500	2,100	.....	.....	.....	.....	.....
Pana	8,000	1,200	4	.....	12 blocks	all	.....
Paris	9,500	5,000	2	.....	16 blocks	all	.....
Paxton	3,013	1,000	1	.....	6 blocks	.....	4
Pontiac	6,500	1,000	2	.....	.....	.....	.....
Rochelle	4,000	.....	.....	.....	.....	.....	.....
Rushville	3,000	420	.....	.....	.....	.....	.....
Watseka	3,500	500	4	1,000	1/2 acre	.....	4
Waukegan	20,000	13,854	.....	3,500	1/4	3 1/2	1 1/4
<b>Indiana:</b>							
Alexandria	5,100	3,500	.....	1,200	1/16	all	.....
Anderson	30,000	24,336	3	.....	3/16	1/2	1/2
Attica	4,000	600	.....	.....	.....	.....	.....
Batesville	3,000	.....	2	.....	.....	.....	.....
Bloomington	12,000	5,000	.....	.....	.....	.....	2 1/4
Connersville	1,200	.....	.....	.....	.....	.....	all
Crawfordsville	8,000	11,000	16	.....	.....	.....	2
Decatur	5,000	1,675	.....	.....	16 blocks	.....	.....
Elkhart	22,000	27,000	.....	.....	.....	.....	.....
Elwood	13,000	7,000	4	.....	.....	1/4	.....
Garrett	5,000	.....	.....	.....	.....	.....	.....
Gary	45,000	64,200	31.7	15,000	.....	.....	3
Greenfield	5,000	.....	.....	.....	.....	.....	.....
Jacksonville	5,000	680	.....	.....	.....	.....	.....
Kokomo	25,000	19,475	.....	.....	16 blocks	.....	.....
La Fayette	22,000	34,000	4	.....	.....	.....	2 1/2
Lawrenceburg	4,500	.....	.....	.....	.....	1	1
Linton	8,000	780*	.....	.....	.....	.....	.....
Madison	8,000	6,750	.....	.....	.....	1	1
North Manchester	3,500	600	1	1,200	4 1/2 blocks	.....	whole city
Plymouth	4,500	2,500	.....	1,000	.....	2	all
Portland	6,000	6,275	2	.....	1/2	2	.....
Princeton	8,000	.....	.....	.....	.....	1	.....
Richmond	30,000	26,800	.....	.....	.....	.....	.....
Rockport	3,000	.....	.....	.....	.....	.....	.....
Shelbyville	11,000	6,000	.....	.....	4	4	.....
Sullivan	6,000	.....	.....	2,000	.....	all	.....
Vincennes	18,000	15,000	.....	.....	.....	.....	.....
Winchester	6,000	.....	.....	.....	.....	.....	.....

For footnotes, see page 572.

## GENERAL INFORMATION CONCERNING FIRE DEPARTMENTS—Continued.

City	Population	Latest ap- propriation	Built-up area sq. miles	No. of buildings in protected area	Area of congested value district, sq. miles	First alarm area for	
						horse apparatus, sq. miles	motor apparatus, sq. miles
<b>Iowa:</b>							
Burlington	25,000	20,500	4	3,000	15 blocks	all	all
Chariton	5,500	.....	4	.....	.....	4	7
Cherokee	5,000	.....	.....	.....	.....	.....	.....
Council Bluffs	32,000	29,000	.....	900	.....	.....	.....
Cresco	3,200	.....	.....	.....	.....	.....	.....
Davenport	50,000	68,000	9 1/2	.....	3	1 1/2	.....
Des Moines	105,000	156,000	54	.....	2	1	2 1/4
Ft. Dodge	24,000	12,571	4	.....	30 blocks	.....	4
Grinnell	5,035	2,200	2 1/4	.....	12 blocks	.....	.....
Iowa City	12,096	4,000	.....	.....	1	.....	4
Muscatine	17,000	10,000	3	.....	90 blocks	.....	3
New Hampton	2,800	.....	.....	.....	.....	.....	.....
Ottumwa	24,500	8,000	.....	.....	.....	.....	.....
Sioux City	47,800	61,000	.....	.....	.....	.....	.....
Valley Junction	3,500	400 <sup>6</sup>	1	1,300	6 blocks	.....	.....
Washington	4,953	1,200	2 1/4	.....	.....	.....	.....
Waterloo	33,000	27,320	13.3	.....	.....	.....	.....
<b>Kansas:</b>							
Atchison	18,000	.....	.....	.....	.....	.....	.....
Caney	5,500	.....	1 1/2	1,500	6 blocks	.....	all
El Dorado	5,000	.....	.....	.....	.....	.....	.....
Fredonia	3,500	.....	.....	.....	.....	.....	.....
Frontenac	4,000	.....	.....	.....	.....	.....	.....
Horton	4,400	.....	.....	.....	6 blocks	.....	.....
Independence	15,000	.....	.....	.....	12 blocks	.....	10 blocks
Iola	11,000	.....	1	.....	4 blocks	.....	1
Kansas City	100,000	120,000	.....	.....	.....	.....	.....
Lawrence	14,000	6,500	.....	.....	.....	.....	.....
Leavenworth	22,000	14,291	.....	.....	.....	.....	.....
Manhattan	7,000	.....	.....	.....	.....	.....	.....
Mulberry	3,000	.....	.....	.....	.....	.....	.....
Newton	9,000	5,000	3	.....	16 blocks	.....	.....
Olathe	3,500	.....	.....	.....	.....	.....	.....
Ossawatomie	3,500	.....	.....	.....	.....	.....	.....
Parsons	19,000	10,000	1	800	1/4	.....	1
Topeka	53,000	92,897	8	20,621	32 blocks	1 1/2	2
Wichita	65,000	66,000	8.5	.....	.....	3	8
Winnfield	9,000	4,000	.....	.....	.....	.....	1
<b>Kentucky:</b>							
Cynthiana	4,000	.....	.....	.....	.....	.....	.....
Franklin	3,500	.....	.....	.....	.....	.....	.....
Glasgow	4,000	.....	.....	.....	.....	.....	.....
Harrodsburg	4,000	1,000	.....	.....	1/2	1/4	.....
Hopkinsville	12,000	3,000	.....	.....	.....	4	.....
Lexington	40,000	51,400	7	7,500	8 blocks	3/4	1 1/2
Madisonville	6,000	.....	4	.....	.....	3/4	.....
Middlesborough	9,000	2,500	1	3,000	.....	3/4	.....
Newport	32,500	17,319	1 1/4	.....	.....	3/4	.....
Paducah	30,000	40,000	.....	.....	.....	3/4	1 1/2
<b>Louisiana:</b>							
Hammond	3,500	.....	4	.....	1	.....	.....
New Orleans	339,075	494,400	196.25	.....	222 acres	5 blocks <sup>9</sup>	5 blocks <sup>8</sup>
Morgan City	6,000	.....	.....	1,200	.....	.....	.....
Ruston	5,000	.....	.....	.....	.....	all	.....
Shreveport	28,000	48,000	600	3	40 blocks	.....	.....
Thibodeaux	3,680	.....	.....	.....	4 blocks	3 blocks	all
<b>Maine:</b>							
Eden	5,000	8,500	3	500	1	1 1/2	.....
Fairfield	4,935	1,200	.....	.....	1	.....	1
Houlton	7,000	8,000	.....	.....	.....	4	.....
Rockland	9,000	4,000	.....	1,900	1/2	1/4	.....
Sanford	12,000	6,880	7	2,000	1/2	1	1
Skowhegan	6,000	4,500	.....	.....	all	all	.....
So. Paris	1,700	.....	.....	.....	.....	.....	.....
Winslow	3,000	.....	.....	.....	.....	.....	.....
<b>Maryland:</b>							
Annapolis	10,000	.....	16	3,000	.....	1	16
Cumberland	26,000	17,000	.....	.....	.....	1/2	1 1/4
Easton	5,000	.....	2	2,000	.....	1	.....
Salisbury	11,000	192	4	.....	1	all	all
<b>Massachusetts:</b>							
Arlington	15,000	16,000	.....	3,000	4	1	all
Attleboro	16,215	50,000	.....	.....	.....	1 1/2	7
Boston	750,000	2,000,000	47	102,995	5	1 1/2	1
Cambridge	110,000	172,879	.....	16,874	.....	1 1/2	2
Chester	43,426	62,000	1 1/2	5,900	1	1	2 1/2
Chicopee	30,198	49,529	.....	.....	.....	3/4	1
Clinton	13,000	14,000	.....	.....	1,000 acres	3	3/4
Easthampton	10,000	7,000	.....	1,500	5	.....	.....
Fall River	130,000	169,000	.....	20,000	.....	.....	.....
Fitchburg	40,000	71,774	24	.....	12	.....	all
Franklin	7,000	3,600	.....	3,000	2	1/2	4
Gardner	16,500	23,000	.....	.....	.....	3/4	1
Gloucester	24,500	54,000	.....	5,974	.....	.....	.....
Greenfield	13,000	.....	.....	.....	.....	1	2
Hingham	5,500	6,000	.....	.....	.....	1	.....
Ipswich	6,300	6,800	.....	.....	.....	1	.....
Lowell	111,000	190,000	.....	20,086	10	3/4	1 1/2
Lynn	90,000	148,790	.....	.....	7	.....	2
Malden	50,000	6,700	.....	.....	1/4	3/4	1 1/2
Maynard	6,500	4,000	800	.....	1/16	1	2 1/4
Middleboro	10,000	.....	.....	.....	.....	.....	.....
Milton	8,882	26,000	.....	.....	.....	1 1/4	all
New Bedford	115,000	164,000	12	.....	.....	.....	.....
Newton	43,000	88,000	19	11,694	6	1 1/2	2
North Andover	6,000	7,500	2	600	1	2	2
North Easton	5,500	2,500	5	1,350	1 1/4	1 1/4	5
Norwood	12,500	6,000	.....	2,500	.....	.....	10
Orange	5,300	4,100	1 1/2	884	1/2	.....	.....
Peabody	18,000	43,000	.....	4,000	3	1/2	1 1/2
Pittsfield	40,000	41,857	41	5,895	1	.....	1 1/2-2
Reading	6,796	6,475	7 1/2	1,759	1	3	7 1/2
Revere	30,000	.....	.....	.....	.....	.....	.....
Salem	40,000	70,000	.....	.....	.....	.....	.....
Saugus	10,300	5,875	.....	.....	.....	3/4	1 1/2

<sup>1</sup> For salaries. <sup>2</sup> Automobiles cover all first alarms; horse on second. <sup>3</sup> From house near center of city, run is from 3 to 4 miles in some cases. <sup>4</sup> Varies, this is farthest. <sup>5</sup> Of city. <sup>6</sup> Salaries only. <sup>7</sup> Only called on second alarm. <sup>8</sup> In congested districts. <sup>9</sup> Truck responds to all. <sup>10</sup> For 6 months. <sup>11</sup> Does not include salaries. <sup>12</sup> About 2 miles long. <sup>13</sup> Flying squadron answers all alarms.

## GENERAL INFORMATION CONCERNING FIRE DEPARTMENTS—Continued.

Massachusetts (Continued): City	Population	Latest ap- propriation	Protected area sq. miles	Built-up area sq. miles	No. of buildings in protected area	Area of congested value district, sq. miles	First alarm area for	
							horse apparatus, sq. miles	motor apparatus, sq. miles
Somerville	88,000	109,000	3	14,000	1	1	1	1½
Springfield	105,000	51,000	42	700	1	5	8	
Taunton	36,000	1,500	2	700	1	all		
Tewkesbury	4,662	11,500	.....	.....	.....	.....	.....	.....
Wakefield	13,000	3,500	.....	4,500	5	3-10	13	
Walpole	6,000	2,800	.....	.....	.....	.....	.....	.....
Waltham	30,140	23,581	.....	.....	.....	4½	4½	
Warren	4,500	14,000	.....	.....	.....	2	3	
Watertown	7,500	4,350	4	1,625	¼	.....	.....	.....
Wellesley	7,780	15,000	.....	.....	.....	.....	.....	.....
Whitman	4,500	23,500	1	2,560	.....	1	2	
Williamstown	12,758	23,500	.....	.....	.....	½	¾	
Winthrop	170,000	295,000	.....	.....	.....	.....	.....	.....
Worcester	.....	.....	.....	.....	.....	.....	.....	.....
<b>Michigan:</b>								
Adrian	12,000	10,000	14	3,500	1	all	all	
Albion	8,000	6,000	6	.....	2	.....	6	
Ann Arbor	20,000	20,000	.....	.....	.....	.....	.....	.....
Bay City	50,000	63,391	.....	.....	½	1½	.....	.....
Bessemer	5,000	4,000	.....	.....	.....	4	.....	.....
Coldwater	6,145	4,000	.....	.....	.....	1	1	
Detroit	725,000	1,500,000	41	.....	.....	.....	.....	.....
Flint	65,000	60,000	6	.....	.....	.....	.....	.....
Grand Haven	6,500	7,500	3	.....	¾	2	.....	.....
Grand Rapids	130,000	268,395	23	47,000	1	3	.....	.....
Hastings	5,000	5,000	.....	.....	10 blocks	all	.....	.....
Hillsdale	5,000	4,000	.....	.....	½	1	1	
Lansing	52,000	52,733	8½	.....	.....	.....	.....	.....
Lapeer	4,000	.....	.....	3,000	1	.....	.....	.....
Mt. Clemens	10,000	8,000	.....	.....	.....	.....	.....	.....
Muskegon	24,100	5,000	.....	5,478	1	.....	.....	½ to 2
Norway	4,975	5,000	.....	.....	.....	.....	.....	.....
Owasso	10,000	10,000	.....	.....	.....	.....	.....	.....
Ypsilanti	7,500	.....	.....	.....	.....	.....	.....	.....

(To be continued)

## MONOLITHIC BRICK PAVEMENTS IN CITIES

## Experiences With this Type of Construction in Wichita

## —Changes in Method to Adapt it to Municipal Conditions

By P. L. BROCKWAY.\*

The article by Mr. Greenough in a recent number of Municipal Journal on "Recent Developments in Brick Pavement Construction" is very good indeed. His five points of superiority claimed for monolithic construction are well chosen and great things are expected of this type of pavement. It is believed that the laying of 2½-inch vertical fiber brick monolithically with a 4-inch concrete base and filled with grout is sufficiently superior to a plain concrete pavement of equal total depth, both in lower maintenance costs and in freedom from angular dust and objectionable glare from sunlight, to more than offset the additional first cost. In districts where the only crushed stone available is soft and porous, such as we have in central Kansas, the advantage of the brick surface veneer on a concrete pavement is especially obvious.

The methods of construction of this type of pavement must be considerably modified from those recommended by the National Paving Brick Makers' Association when applied to the paving of city streets and alleys. In the first place the contour of the street is constantly changing owing to intersections at cross streets and alleys. Secondly, width of 30 to 40 feet, or even more, would require a very heavy and expensive template to be rigid enough to gauge off the concrete and dry mixture without springing over stiff spots in the concrete and leaving ridges. Thirdly, in alleys there are nearly always poles, projecting foundations, manhole covers and other unavoidable obstacles which would practically prohibit the placing of steel side forms and the striking off of the concrete with a full length double template. Fourthly, the average city contract is not nearly so large as the present ordinary highway contracts, and the variation in width

and cross section of different streets is such that the purchase or construction of sufficient templates to last through a season would make too large an overhead expense in the construction of the pavement.

Therefore, if we are to make this excellent type of pavement economically feasible we must abandon the method laid down for ideal working conditions and devise one to suit conditions as we find them.

Success comes through experiment and avoidance of failures. The first modification of the double gauge made by us consisted in laying concrete just plastic enough that water would not run out; and ramming, spreading and smoothing it with shovels to a relatively smooth surface about an inch below finish grade. Then as soon as this mortar had settled (not set), which is indicated by the fact that water ceases to rise, a dry mixture of sand and cement was placed on the base of sufficient depth to fill up all unevenness in the base, and was struck off as you would treat a sand cushion, either by hand loops, or by short templates resting on screeds, as many as necessary to reach across the pavement. Light wooden templates may be lifted around poles and manholes, and the surface finished by hand loops at these places. Intersections also must be finished without the use of templates. The dry mixture makes a tough skin which may readily be walked over even when the concrete is fairly soft.

Then the brick were laid on this prepared bed as usual, being carried in to place and laid with the lugs all one way, and the best face upward. Then a fairly heavy sprinkling of water was applied to furnish moisture for the dry mixture. Examination later showed that while moisture between the brick softened the grout sufficiently for it to work up in the joints, the mixture under the body of the brick was moist enough to set all right, but not plastic enough to work into the rough surface of the brick and make a bond. When it is remembered that this is to be a monolithic pavement, that method is obviously a failure.

Next was tried the laying of a wet mixture of sand and cement on the base with as little water as could be used without the mortar rolling and graining under the gauge

\*Assistant City Engineer, Wichita, Kan.

This succeeded fairly well if the base course were allowed to stiffen enough so that it would not be worked up by the workman walking on it. This particular contract was in an alley with buildings along both sides and everything had to be carried in over the base or brick. The wet mortar did not provide any tough skin, and it was very difficult to keep the brick from floating out of line and grade as they were laid. This pavement was absolutely monolithic, the mortar working entirely to the top of the four inch brick in places, but on account of the difficulty of making an even surface was not a success.

The original method of spreading dry mixture was then used, an ordinary garden sprinkling can was obtained and the dry mortar cushion sprinkled just ahead of the brick setter. Water was added in this way until it just saturated the dry mixture and began to show on top. This light sprinkling does not separate the sand and cement nor destroy the toughness of the surface. Of course the more the moisture that rises from the concrete the less the sprinkling required, and every square foot of the surface can be left just as required by ordinary unskilled labor. After the laying of the brick, they were culled and given a heavy sprinkling from a hose, enough water being added to stand between the brick. While wet, the brick were rolled with a hand roller about 20 inches in diameter and two feet long weighing about 300 pounds. This settled and smoothed the brick into the soft mortar, leaving an even surface. Examination showed the brick to be bedded into a layer of mortar, intimately bounded to it and no separation of the sand and cement; in other words, a truly monolithic pavement.

Grout is applied immediately, the first application being made wet enough to flow readily into the joints. It will force the surplus water ahead without washing out cement, the water running ahead of the grout perfectly clear. After the first grout has settled, a second application of stiffer mix is applied to fill the tops of the joints. If this is made so stiff that occasional light sprinkling is required to keep it from balling up under the squeegee, it can be cut almost entirely off the surface with a metal edged squeegee, and will not settle any more.

It is our experience that mortar mixed in any good batch mixer is far superior to any hand mixed mortar. It is more uniform in every way, whether discharged directly from the machine to the pavement or conveyed a short distance in wheelbarrows. A striking proof of its thorough mixing and uniform consistency lies in the fact that wet, freely flowing, machine-mixture mortar will show no laitance as it is swept along; but if sprayed with water, the white laitance will pop up where every drop of water touches it. It is believed that the unevenness of wear of grout in the joints of brick pavement where the grout was mixed by hand is caused by streaks of this laitance floating ahead of each batch. Machine-mixed grout does not show this unevenness, and is holding up much better.

Why not use expansion joints in the pavement? They can be used by cutting a lower strip the depth of the base, and placing it carefully in the base parallel to the brick courses above, and then placing another strip between the brick as nearly over the lower one as possible. It will be found that they can be made to join within an inch, by crowding the brick, in nearly every case. Of course a pre-constructed plastic joint filler must be used.

Again, why not lay brick at an angle to traffic, or curbs, of 30 to 45 degrees? Pavements six years old under identically the same traffic and laid exactly the same, of the same brick, except that some are at right angles, and some at an angle of 45 degrees, show a marked difference in favor of the latter. The bricks at an angle have worn

smooth, the asphalt filler remaining flush with the top of the joint, and the surface has remained even. Traffic has been fairly heavy on the street under observation, and the brick laid at right angles to traffic are quite appreciably worn by chipping on the edges and the filler is gouged out for a depth of fully half an inch. The brick have settled in uneven waves, in the 1½-inch sand cushion, sufficiently deep to cause an unpleasant tremor in automobiles driving over them.

#### SAFETY MIRRORS ON DANGEROUS TURNS.

The use of mirrors on dangerous curves to avoid the possibility of collisions has been suggested and has been tried in one or two places. One of the latest installations is in Denver's municipal mountain park, where two have been placed at the sharpest curves on the Bear Creek Canyon section of the road. These provide a guard against accidents by enabling drivers to see what is approaching from the other side of the curve. The mirrors are described in *Motor Print* as follows:

They are 3 feet high by 5 feet wide and are securely mounted on posts of iron pipe, which are cemented in the rock and located on the outer edge of the road. Heavy wood frames covered with copper are used, the frames being so constructed as to prevent injury to the mirror by moisture. The cost of the mirrors and the work of installing amounts to about \$50 each. A campaign is now on to place about a dozen more mirrors on other dangerous curves.



MIRROR AT BEND OF ROAD, DENVER.

The mirrors were donated by the McPhee & McGinnity Company, and the Mountain States Telephone Company furnished equipment for drilling the holes in the rock. To guard against the breaking of the mirrors by rowdies having no consideration for public property or public safety, the Denver Motor Club offers a reward of \$25 for information leading to the conviction of anyone damaging or defacing the mirrors in any way.

#### TRAFFIC ON FIFTH AVENUE, NEW YORK.

A count of traffic on Fifth avenue, New York, is made at intervals by the Fifth Avenue Association. The latest count was made on October 18th, and showed that between 8 A. M. and 6 P. M. 17,151 vehicles passed north and south at Forty-second street, which is 1,300 more than on January 26th. This means about a vehicle each two seconds. The number crossing Fifth avenue along Forty-second street was about half as great. Commercial vehicles constitute only about 2 per cent of the total on Fifth avenue; while they amount to about 30 per cent on Park avenue, which parallels it one block away.

# Municipal Journal

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years' research and practical experience in its special field, is at the  
command of our subscribers at all times and without charge.

## MAINTAIN ALL ROADS ALWAYS.

In an address before the American Road Builders' Association last week, the retiring president, Col. E. A. Stevens, placed particular emphasis on the importance of maintenance of roads. A road can be built of almost any material, said he, and be made to give good service if only sufficient attention be paid to maintenance; citing as an illustration the roads used by the French to serve the army at Verdun, which are being used up to their limit of capacity, day and night, for heavy trucks of all kinds, and yet are surfaced with a soft limestone. But the secret is the continuous maintenance by an army of men, averaging one man to every five feet of road.

The cost of such an army of men would of course be prohibitive for any but an exceptional case of this kind; but the extreme illustrates the theory and the possibility. Any road can be maintained in good condition and every road should be. As a general rule, the total cost of maintenance combined with interest and proper depreciation on a road considered relative to the traffic carried, should be kept at a minimum; but the road should be maintained in good condition at all times to carry all traffic legitimately using it. When this combined cost can be reduced by improving the character of the pavement, then this improvement should be made.

Says E. W. James, chief of maintenance of the U. S. Office of Public Roads: "The greatest part of the large annual expenditure for roads is for construction. Another large part is spent in repairing worn-out roads. Very little is spent systematically for maintaining in good condition roads already built. \* \* \* The first step toward remedying this condition is really a very simple one. Every mile of improved road built by a county from any fund whatever should create a determinable annual liability against the annual road revenues of the county. This liability is determined by a com-

petent engineer as the probable annual cost of maintenance of that particular mile of improved road."

This is only a plain business proposition, and yet few cities, counties or states even approximate it in practice. For instance, Mr. James gives \$30 per mile per year as the probable cost of maintaining a dirt road in a certain county, and \$125 as the cost of maintaining a gravel road using the best local materials. Consequently for every mile of dirt road which is graveled, \$95 should be added to the road maintenance budget for the following years. Until the county is able and willing to do this it should not throw away money by putting it into a gravel road which will be permitted to go to pieces from neglect.

A municipality should maintain all its streets in any event. Then as fast as they can afford to do so they should improve them. But maintenance should never be neglected in order to raise funds for reconstruction; and maintenance of all new pavements should begin the day they are laid and be fully provided for in every budget thereafter.

## TRYING OUT WATER FILTRATION PLANTS.

Except possibly for a few small plants, no two filtration plants are alike, and probably no two are operated under just the same conditions. The sizes vary; improvements are continually being made in details, or changes tried which it is hoped will prove to be improvements; most important of all in most cases, the water to be tested is different in each plant, and for each varies periodically in a different way. For these reasons, each filtration plant is a problem in itself, to be solved only by intelligent study under working conditions.

Some of the problems to be studied and solved are suggested by the description in this issue of the first year's operation of the St. Louis plant. The most effective rate of washing and that most economical of water, and the possibility of hastening the securing of a clear effluent after washing, was one of the first matters to receive special attention. The maximum rate at which the water could be filtered without affecting the degree of purification, and at the same time without so seriously clogging the beds as to decrease the time efficiency of the plant as a whole, furnished another important study.

The matter in suspension in the raw water varied from 110 to 9,000 parts per million, and each variation required a change in amount of chemical used or other feature of the treatment given it. The character of the chemical itself changed in some cases, and difficulties were caused by varying degrees of impurities.

The above suggest some of the reasons why a filter plant can not, when completed, simply be turned over, with a set of printed instructions, to the supervision of a superintendent with no knowledge of the chemical and other principles involved. Every new plant should be placed in charge of an expert, at least until it is tried out; and the larger plants should remain permanently in charge of such. Otherwise full efficiency can not be expected.

## MUNICIPAL BONDS IN DEMAND.

The present would seem to be a favorable time for marketing municipal bonds, according to the latest report of the "Bond Buyer," whose reports show that the volume of financing arranged by states, cities and other municipalities in the United States during October totaled nearly thirty-eight million dollars, 46 per cent more than last October, and considerably more than any previous October. Moreover, the issues of the larger cities, such as those legal for Eastern savings banks, are now selling on a net income basis well below 4 per cent.

## A. S. M. I. SHEET ASPHALT SPECIFICATIONS.

The following letter has been received from the chairman of the Asphalt Paving Specification Committee of the American Society of Municipal Improvements, as a reply to a letter published in our issue of October 26th.

Editor MUNICIPAL JOURNAL,  
New York City,

DEAR SIR: It appears to the writer very unfortunate that the title, "WIDE OPEN" OR ALTERNATE SPECIFICATIONS" was selected for the discussion started by Mr. Pierce's letter, as it gives a totally wrong idea of the matter at issue. The asphalt specifications adopted by the A. S. M. I. at Newark and the alternate specifications proposed by Mr. Swan and drawn up by Mr. Flood are *identical so far as the asphalts admitted under them are concerned*. In other words one specification is no more "wide open" than the other and the records show that Mr. Pierce's "narrow margin" by which the alternate specifications were defeated was a roll call vote of 59 against to 33 for their adoption.

Mr. Flood's proposed specification separated the asphalts under them into two classes, as stated by Mr. Pierce, and not only "contemplated," but made it *mandatory* that separate bids should be received on each class, regardless of whether the engineer desired or local ordinances would permit of such procedure.

The tests prescribed by Mr. Flood's specifications were exactly the same for both classes of asphalts and *are identical with those contained in the A. S. M. I. specifications*.

Mr. Flood's contention that engineers who desired specific classes of raw materials would prefer the form he suggested did not appear well founded, as he provided only two classes—the asphalts coming under one of these classes being controlled by one manufacturer, while the other class embraced all the other paving asphalts on the market. His classification was based upon whether the asphalt as found in nature had a consistency greater or less than 100 penetration at 77° F., i. e., whether it was comparatively soft or hard, regardless of the composition or character of the finished product. For instance, Trinidad refined asphalt with only 56 per cent of bitumen was classed with Bermudez refined asphalt containing approximately 95 per cent of bitumen, the bitumen in the two asphalts being totally different in character.

If classification is desirable and necessary, surely it would be logical to make at least as many classes as there are different sources and kinds of crude materials and this would have to be done to aid the engineer to the extent that Mr. Flood suggests is advisable.

Let us next consider what Mr. Pierce states is Mr. Flood's "most impressive point," viz.: the identification for record of the kind and source of asphalt used in a pavement. The present A. S. M. I. specifications contain the following clause which would appear to amply cover this point:

8. Samples.—One (1) pound samples of the refined asphalt, petroleum flux and asphalt cement that the contractor proposes to use in his work, together with a statement as to the source, character and proportions of the materials composing them, must be handed in with his bid and no contract shall be awarded to any bidder whose samples do not comply in every respect with these specifications. No asphalt other than that specified in his bid shall be used by any contractor except with the written consent of the engineer and provided that it complies in all respects with the requirements of these specifications."

Mr. Flood's specifications contain this same clause without any additional provisions for identifying the asphalts, hence the "impressiveness" of his argument is lost upon the writer.

For these reasons the Sheet Asphalt Specifications Committee of the A. S. M. I. declined to insert in its specifications the arbitrary classification above described. Such classification would put the products of one producing company, the Barber Asphalt Paving Company, in a class by itself and when coupled with a mandatory provision that separate bids should be received on each class, would appear very much like discrimination in favor of a single producer. The committee, however, pointed out that wherever an engineer felt that local conditions as to bidders or material rendered it advisable in his judgment to make a classification and bid distinction, he could very easily prepare a clause making such a classification (which might well be different from Mr. Flood's) as he desired, and add it to the present A. S. M. I. specifications, no further change in them being necessary. Such a clause should be drawn up by the city solicitor in order to comply with local laws and ordinances and needs no expert paving knowledge.

With regard to the quotation from the 1916 Good Roads year book, the writer prefers to limit his remarks to the statement that, in his twenty years' experience in the mining and refining of asphalts and the laying of pavements in the United

States, Canada, Great Britain and France, he has never found the need or justification for alternate specifications and disagrees most emphatically with the statement quoted.

Mr. Pierce's summary of arguments in support of what he terms alternate specifications is elaborate but hardly convincing. The only classification which he apparently thinks worthy of consideration is that which divides what he calls "natural asphalts" from those which he terms "oil asphalts," the first class from a commercial point of view being controlled by his company. Surely such a classification has no logical basis. Neither the engineer nor the taxpayer cares whether the asphalt as found in nature is soft or hard, provided it possesses the essential qualities to make a good pavement. No asphalt as found is suitable for paving purposes without refining, during which process it is materially changed. Who would recognize crude Trinidad asphalt as the same material which, in the form of Trinidad asphalt cement (after having 30 per cent. of water removed and being heavily fluxed with an oil residuum), enters into the composition of a pavement? Assuming that physical and chemical characteristics are to form the basis of the classification, surely Trinidad and Bermudez should not be in the same class, and for the same reason California, Mexican and Texas asphalts should be in separate classes. Differences in processes of refining might well serve as a basis for further classification. Carrying Mr. Pierce's suggestion to its logical conclusion, we should certainly have more than five separate classes. If a separate bid were to be received on each class the endless possibilities thus provided for lobbying would make it farcical to term such a procedure *competitive bidding*.

It would appear to be a fair inference to draw from Mr. Pierce's summary that, even though the same tests are applied to the two classes he advocates, there is a subtle difference in quality between them which is not revealed by these tests. Perhaps there are good grounds for this belief, but it must be remembered that the failure of a pavement does not necessarily mean the asphalt was bad. The bitumen constitutes only approximately 10 per cent. of the pavement and many other contributing factors affect its life. No asphalt ever produced uniformly good pavements. Mr. Pierce probably believes that the asphalts sold by his company are better than those sold by his competitors. He is entitled to that belief, but his competitors are entitled to a similar belief and if his asphalts are entitled to a separate classification on those grounds, it is not fair or logical to insist that all other makes shall be lumped under a single classification. It is indeed unfortunate, as he says, "that this subject should have been so often discussed from the viewpoint of the interest of one class of asphalt producers or the other."

Yours truly  
FRANCIS P. SMITH.

## DEDICATION OF EASTON-BETHLEHEM ROAD.

The concrete road between Easton and Bethlehem, which was described in our October 5th issue, was dedicated on November 2nd as a part of the Pikes Peak Ocean to Ocean Highway, of which the section across Pennsylvania is known as the William Penn Highway. The dedication was under the auspices of the William Penn Highway Association. Three special trains were run from New York, Philadelphia and Harrisburg respectively, and a special car from Scranton and Wilkes-Barre, which brought in nearly two thousand from a distance; while about an equal number assembled from the cities within fifteen or twenty miles.

A procession of automobiles eight miles long passed over the road from Easton to Bethlehem, where the ceremony of cutting a tape barrier was performed; and then returned half way to a park, where luncheon was served and addresses made by Charles M. Schwab as chairman; Governor Brumbaugh of Pennsylvania; G. A. Viehmann, director of the New Jersey State Chamber of Commerce, representing Governor Fielder; Henry J. Steele, member of Congress and a prime mover in having the road built; W. D. Uhler, chief engineer of the State Highway Department; E. W. Stern, chief engineer of the Bureau of Highways of Manhattan borough, New York; and E. J. Cattell, of Philadelphia. Altogether it was probably the biggest "road booster" that has been held in the eastern states.

All the materials for this road were donated, the 40,000 barrels of cement by the cement companies of the Lehigh Valley district in proportion to their respective outputs. The state paid for the labor and supervision only.

# The WEEK'S NEWS

State Highway Progress in Michigan, Georgia and Iowa—Passaic Valley Sewer Situation—Sewage Disposal Argument in Harrisburg—Fort Worth's Waterworks Finances—Niagara Falls in Bitter Fight with Water Company—New York Edison Makes Voluntary Rate Cut—Sale of Property May Cut Kansas Gas Tangle—Public Utility Legalities in Pittston, St. Louis and Hackettstown—Heating Unit for Gas Approved—Bureau of Municipal Research Disapproves Two-Platoon System—Police Civil Service in Massachusetts—Haverhill Officials Acquitted—New York City's Great Budget.

## ROADS AND PAVEMENTS

### Big Bond Issue Defeated.

Fresno, Cal.—Fresno county will not have paved roads for some time, the \$3,600,000 bond issue having failed to get the required two-thirds majority after a two or three year campaign. In 166 precincts out of 201 the vote stood 8,488 for the bonds and 6,534 against the issue, the remaining precincts being small. Not even Fresno city cast the required two thirds majority in favor of the bonds, being 3,601 for and 1,915 against. Coalinga went almost unanimously for the bonds, and so did the surrounding district, the six Coalinga precincts casting 600 votes for the bonds and only 30 against them.

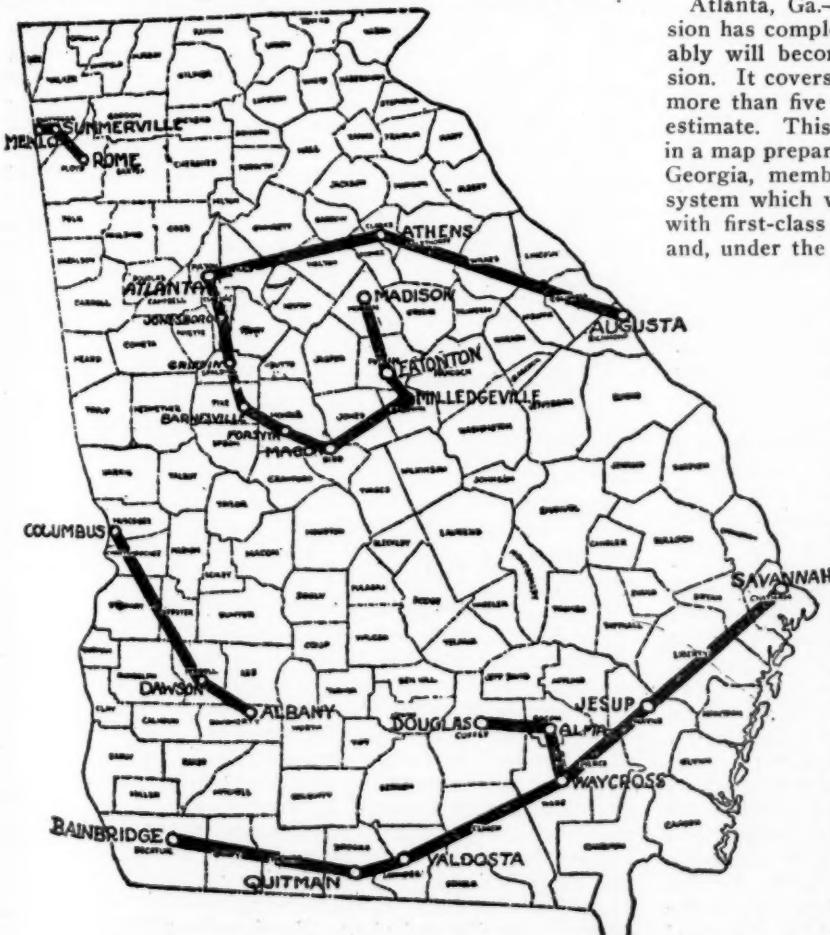
### County Road Fund Apportionment.

Lansing, Mich.—Figures compiled by auditor-general O. B. Fuller, from 1903 to 1916, inclusive, show that the total state highway tax apportioned among the various counties was \$4,435,000, and the amount of state reward money returned to the counties \$3,344,236.96. During the last thirteen years the counties paid in state reward taxes \$1,090,763.04 more than they received in state rewards. Highway Commissioner Frank Rogers has worked out a tentative plan for

the distribution of the federal appropriation for good roads in the state to be used during next summer. The plan is to help the smaller counties. Mr. Rogers intends to use all of the government money on the so-called "legislative trunk lines." In some counties he would have the state share one-half the cost with the county, while in others the state pays nothing and the county all. The federal money goes for 50 per cent. of the total expenditure in all cases. Mr. Rogers has divided the counties into districts, the classification being based upon the assessed valuation for every trunk line mile. The classes are as follows: Counties below \$100,000—state to pay 25 per cent. and the county 25 per cent.; counties between \$100,000 and \$200,000—state 20 per cent. and county 30 per cent.; counties between \$300,000 and \$350,000—state 15 per cent. and county 35 per cent.; counties between \$300,000 and \$400,000—state 10 per cent. and county 40 per cent.; counties between \$400,000 and \$500,000—state 5 per cent. and county 45 per cent.; counties above \$500,000—state nothing, county 50 per cent.; each county has been allotted a certain mileage of trunk line which is to be built with the combined aid of the federal, state and county money.

### State Highway Plans in Georgia.

Atlanta, Ga.—The newly created state highway commission has completed preliminary work on a plan which probably will become the permanent program of the commission. It covers some 5,500 miles of roads and would require more than five years to complete, according to the present estimate. This state-wide system of highways is set forth in a map prepared by Professor Strahan, of the University of Georgia, member of the commission, and contemplates a system which would connect every county site in the state with first-class highways. This will require much money, and, under the present system of road building in Georgia, will require an absolutely complete co-operation between every county in the state and the highway commission, if federal aid is to be used in constructing links of highways through every county. To begin with, the commission has decided upon eight principal highways for the present for which federal aid will be asked. These highways are shown on the accompanying map of the state. Beginning at the northern end of the state these eight routes are as follows: Rome via Summerville to Menlo; Atlanta via Athens to Augusta; Atlanta via Griffin, Barnesville and Forsyth to Macon; Macon via Milledgeville and Eatonton to Madison; Bainbridge via Quitman and Valdosta to Waycross; Douglas via Alma to Waycross; Waycross via Jesup to Savannah. It is regarded as likely that the highway proposed from Augusta to Atlanta will receive first consideration from the secretary of agriculture, for the reason that federal surveys have already been made in the counties of Oconee and Walton on this route. The entire program contemplates work enough for eight or ten years. The federal appropriation now covers but five years, during which period Georgia should receive some \$2,000,000.



PROPOSED STATE HIGHWAY ROUTES IN GEORGIA.

**Street Paving in Baltimore.**

Baltimore, Md.—The work done by the Paving Commission of the city in 1915 was principally confined to the western sections of the city, though a great deal was done in other sections. New improved paving to the extent of 467,949.22 square yards, or 26.59 miles, of an average width of 30 feet, was laid during the past year, at a cost of \$1,163,135.89. The total amount of new improved paving laid by the Paving Commission since it started work in 1912 to December 31, 1915, was 1,978,186.03 square yards, or 112.40 miles, of an average width of 30 feet, at a total cost of \$4,977,245.33, including administrative and construction salaries, testing materials, etc.

**Increasing Road Improvement Efficiency in Iowa.**

Des Moines, Ia.—Thomas H. MacDonald of Ames, highway engineer for the state highway commission, reports that fully 50 per cent. of the money spent on the highways now goes into bridges. These bridges are particularly designed and constructed for permanence. The state auditor's report for 1916 shows that in the past two years highway taxes have decreased to the amount of \$814,080.63 in spite of the fact that more permanent bridge building and more work on the roads has been done than ever before. In fact in the past year alone there has been a saving of about \$600,000 in this highway tax. In 1914 the total highway tax was \$11,160,368.59, while in 1916 it amounted to \$10,346,288.17. In 1915, according to Mr. MacDonald, there was expended \$13,500,000 on highways and bridges in Iowa. Of this amount \$3,300,000 was spent on county roads and \$3,500,000 was spent on township roads. This makes \$6,800,000 out of the \$13,500,000 which was expended on roads. The remainder, or \$6,500,000 in round numbers, was spent on bridges. Of the rest \$25,000 was really spent on bridges, for it went to pay for filling in for bridges and culverts, but it is charged to the road fund.

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**SEWERAGE AND SANITATION**

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**"Health Week" Exhibit Effective.**

Beverly, Mass.—The "Health Week" exhibit in the city hall drew large and interested crowds and proved an excellent means of educating the public in health matters. The city public health dispensary, the Anti-Tuberculosis Society and other civic agencies cooperated to prepare the exhibit. Charts, models, specimens and novel electric displays drew responses from the visitors. A number of local and state doctors and nurses gave interesting talks.

**More Money and Time for Passaic Valley Sewer.**

Newark, N. J.—The Passaic Valley trunk sewer cannot be completed by December 31, 1917, the date last set by the Legislature for cessation of pollution of the Passaic river. Neither can it be built for \$11,250,000, subscribed by the fifteen municipalities now in the sewer agreement. The cost will probably be at least \$13,000,000. Solution of the financial difficulty, however, would come automatically with the expected participation in the project of the five municipalities which have hitherto held off. If all enter there may even be a rebate to each of the twenty communities. These facts have been admitted by the Passaic Valley Sewerage Commission, which is directing construction and administering the funds provided by the fifteen municipalities subscribing to the improvement. The municipalities which have under consideration making a late connection with the trunk project are East Orange, Montclair, Bloomfield, Orange and Glen Ridge. Most of these are regarded as certain of joining. If the largest community, East Orange, should stay out, the financial problem can be solved by an additional assessment on the municipalities now in the project. Work on the uncompleted tunnel under Bayonne and New York Bay, probably the most difficult and certainly the most essential part of the improvement, cannot be resumed until funds considerably in excess of \$11,250,000 are available. The legal difficulty will have to be met by application to the Legislature for another time extension. From the first days of the commission, members declare, the stand has been taken that contracts were not to be entered into until the cash for the total liability was practically in hand.

Thus the dilatory payment of apportionments by various communities has led to delay in calling for construction bids. There is outstanding about \$900,000, the last payments by the municipalities having been due October 1, 1914. Bond issues in anticipation of the \$11,250,000, according to Adrian Riker, counsel of the commission, would not be within the province of the commission.

There have been several causes of delay in the construction of the sewer since it was begun in 1912. It is now approximately 85 per cent. completed. There have been both engineering and legal obstacles at various times. The one, however, which brought to an acute point the present difficulty is found in Section 2. This tunnel work was carried on by the O'Rourke Engineering Construction Company for 16,000 feet, largely by the free air method. After two years the company, last spring, gave up the contract, as allowed by its terms, when it was found necessary to prosecute the work with the aid of compressed air. A small portion, however, was done, by special agreement, with compressed air apparatus. The incomplete portion is 10,000 feet. The contract had been let, the commissioners said last spring, for free air work, because more favorable figures could be secured than through a contract for accomplishing the task by whatever method might be necessary. In the portion dug by the O'Rourke company, they declare, a large sum of money was saved. According to commission officials, the O'Rourke company received about \$500,000. The cost of the remaining piece of tunneling may reach \$1,500,000, depending on the ground difficulties encountered. Following the release of the Section 2 contractor, several contracts of minor importance have been let. There remain several small connections and the rest of this section. Otherwise, the various contracts, with one exception, are being worked or have been completed. The exception is the outfall distribution piping in New York Bay, which can be placed only during favorable weather in summer. Litigation brought on by New York's attempt to prevent the discharge of sewage effluent in New York Bay, which was an early cause for delay, is not now, it is said, a matter for concern. Agreement with the Federal Government that objectionable effluent will not be discharged had, said Mr. Riker, taken precedence over any check which might be seen otherwise in the New York court plea. The case is now before the Supreme Court. It remains simply, according to the lawyer, for the commission to hold to the federal stipulation. Demand for a clearer effluent than is planned to be discharged off Robbins Reef, states William M. Brown, engineer of the commission, would not provide an insurmountable obstacle. The clarification process at the pumping station on the Newark Meadows would be carried further.

Newark has sold \$500,000 temporary bonds to run for six months at 3.35 per cent to cover its last payment on its share of the Passaic Valley sewer project.

**Club Women Suspected as Typhoid Carriers.**

Chicago, Ill.—Following the discovery of fifteen cases of typhoid among pupils of the Englewood high school, blood tests were made on a number of prominent club women who conduct the restaurant in the school. Dr. Gottfried Koehler, acting health commissioner, traced the infection to food served to the students and suspected that a "carrier" had handled it. Employees of the school kitchen were examined but no indication of the disease was found.

**State Orders Sewage Treatment.**

Harrisburg, Pa.—Following a dispute about tactics and procedure, the city has finally taken steps to comply with the order of State Health Commissioner Dixon to install a plant for the chemical treatment of the sewage discharged at three points in the Susquehanna river. The original order to stop pollution of the river was given in 1911. City Commissioner Lynch and the other city officials were not convinced of the necessity of disinfecting the city's sewage to protect the communities south along the river, when the communities to the north have taken no such action. While the city will install the disinfecting apparatus, the present council will probably continue to refuse to install a permanent sewage disposal plant. Forcing the action on the disinfection question was due to the prevalence recently of typhoid.

## WATER SUPPLY

### Expert's Survey for Water System.

Cumberland, Md.—James H. Fuertes, consulting engineer, of New York City, who had charge of the engineering work connected with the Evitts Creek water system, has been selected by council to take charge of the engineering work required in connection with the proposed new developments around the site of the Kelly-Springfield plant. Mr. Fuertes will make an investigation with a report upon the feasible means for increasing the capacity of the water works; the capacities of the present street mains, and a campaign for the conservation of the present water supply together with advice on lessening the waste that now exists. A study will be made of the sewerage system with suggestions for its improvement in general, having in view the possibility of the purification of the sewage at some later date when required by the state. A survey will be made of the new section of Cumberland, including a topographical map of the entire tract so that the streets can be located in such positions as to permit an economical development in the matter of road construction combined with transportation, water, sewerage and lighting facilities and so that the saleable lots will have the greatest potential market value. The city expects to be ready to receive bids on all the improvements contemplated by March 1, 1917. The cost of looking after the interests of the city and doing all the engineering work outlined will be \$15,000.

### Profits from Waterworks.

Fort Worth, Tex.—An average of \$10,179.93 a month was the profit of the city waterworks for the eleven months ending Aug. 31, city auditor Adams has reported to waterworks superintendent J. C. Lord. Total revenues of the department for the eleven months amounted to \$254,108.43 and total expenses were \$142,129.16, leaving a surplus of \$111,979.35, of which \$87,648.70 has been turned over to the special fund for the completion of the Lake Worth conduit. The figures show a large decrease in operating expenses from the eleven months ending Aug. 31, 1915, and considerable gain in revenues. Revenues from water rents, exclusive of the independent North Side artesian system, were \$216,688.73, as compared with \$206,601.90 for the eleven months of the year before, a gain of \$10,086.83. North Side revenues were \$37,419.70, as compared with \$33,490.25, a gain of \$3,929.55. The total revenue gain for the eleven months was \$14,016.28. Expenses in the operation of the system exclusive of the North Side system show the greatest decrease. They were only \$118,365.98 under Lord's administration, as compared with \$188,500.62 for the corresponding months of one year previous, a difference of \$70,134.64. North Side expenses were reduced from \$28,189.73 to \$23,763.18, a difference of \$4,426.55, under the present superintendence. Total expenses for the eleven months ending Aug. 31, 1916, were \$74,561.19 less than for the eleven months ending Aug. 31, 1915. The surplus of revenue over expense for the eleven months ending Aug. 31, 1916, was \$88,577.47 greater than for the eleven months ending Aug. 31, 1915.

### City-Company Water Competition.

Niagara Falls, N. Y.—Supreme court justice Edward K. Emery has handed down his decision in the so-called north end water case, granting the Western New York Water company a permanent injunction restraining the city from interfering with the company's main across a number of streets along the New York Central right of way. The case was considered one of the most important brought by the water company, as the whole question of the company's franchise rights in territory other than that included in the old village of Niagara Falls was involved. Justice Emery's decision does not touch upon the rights of the company to lay mains in territory outside the limits of the old village of Niagara Falls. He holds that it was not necessary to deal with the question of territorial rights under the franchise granted by the old village of Niagara Falls, as the company's contract with the New York Central Railroad company was sufficient to make legal the laying of the main.

The company will immediately take steps to test the soundness of its claim that its franchise was extended when the villages of Niagara Falls and Suspension Bridge were amalgamated in 1892 to include the entire city. The city will take an appeal from Justice Emery's decision. When the main was laid in 1913 the city attempted to prevent the carrying on of the work. Then the water company obtained a temporary injunction and the main was laid under the company's guarantee to take it up if a permanent injunction was not granted.

The complex and bitter situation between the city and the Western New York Water Company is growing tenser and city manager O. E. Carr has issued an appeal to the citizens that they meet the company's continuous attempts to embarrass the city by stopping their patronage of the company's service and becoming customers of the city's water plant. The company has appealed from Supreme Court justice Wheeler's decision in favor of the city against the company, which sought to enjoin the city from issuing \$72,000 bonds for the construction of an emergency main which is considered very necessary. The delay due to the appeal has caused the city to lose the free right of way offered by the International Railway Company and the laying of the pipe at a later time will probably cost more than it would now. City manager Carr, in explaining the need of the new main, says: "The city is now wholly dependent upon one 36-inch water main from the pumping station down Buffalo avenue to Sugar street, a distance of 1,400 feet. In case a break should occur anywhere along this distance, the entire city of Niagara Falls would be out of water until such a time as this break could be repaired. The loss to our manufacturers due to a temporary failure of our water supply main, would run well up into the hundreds of thousands of dollars, to say nothing of the inconvenience to our householders, and the possible loss, by fire, in case of a fire, while the city was thus handicapped. It, therefore, had been planned to construct an auxiliary main from the pumping station to Sugar street."

## STREET LIGHTING AND POWER

### Light Rate Cut in New York City.

New York, N. Y.—If the Public Service Commission for the First District accepts the proffer, as it is expected to do, the maximum rates for electric current furnished consumers by the New York Edison Company and the United Electric Light and Power Company for lighting and power purposes will be reduced one-half cent per kilowatt hour beginning January 1. A further reduction will probably take place July 1 next. Announcement of the pending reductions was made at a hearing of the commission following a series of conferences participated in by public service commissioner William Hayward, J. W. Lieb, vice-president of the New York Edison Company, and city chamberlain Milo R. Maltbie, the latter representing Mayor Mitchel, who accepted the proposed reductions. It is provided that the maximum rate of the general rate schedule covering lighting charges shall be reduced from 8 cents to 7½ cents per k.w. hour, from January 1, 1917, to July 1, 1917; from July 1, 1917, there is proposed another reduction from 7½ cents to 7 cents per k.w. hour. The reduction in the maximum power rates from 8 cents to 7½ cents per k.w. hour, beginning January 1, 1917, is to remain in effect until July 1, 1917. The company in making these reductions reserves the right, if unforeseen business conditions affecting the financial status of the company should arise between now and next July, to restore the 8-cent rate. The reduction in rates applies to Kingsbridge and portions of the Bronx east of Bronx River served by the United Company, where a ten-cent rate per kilowatt hour now prevails. It is estimated that the reduction to 7½ cents per kilowatt hour will result in a saving to the consumers of \$750,000 for six months on the rate of the New York Edison Company alone. The reduction for the entire year should approximate a saving to the consumers of both companies of \$1,750,000. Inasmuch as the company estimates that its increased cost for coal next year will be \$1,000,000, the net

reduction in the revenues of the company will be much greater than the saving to the consumers. In October, 1911, the Public Service Commission began an investigation into the 10-cent rate charged by the Edison Company. After four years an agreement was made for an 8-cent rate to run for three years from May 1, 1915. The 8-cent rate carried with it permission to the company to charge for lamp renewals, which amounted practically to an 8½-cent rate. This agreement remained in force without question until February last. The company maintained that the commission was bound by a pledge not to make an appraisal of its plant, but according to chairman Oscar L. Straus, as the commission understood it, either side was at liberty at any time to reopen the hearings. At any rate, in February the commission directed its electrical engineer to make an appraisal of the property of the Edison Company and of the United Electric Light and Power Company, a subsidiary of the Edison Company. On August 21 Mayor Mitchel filed a petition to reopen the entire proceeding. Late in September the commission began hearing arguments for and against a reopening of the rate question. On October 3 Mr. Lieb suggested that a representative each of the company, the commission and the people should meet and see if an agreement could be reached. It was stated that it would take a year at least to make a complete appraisal of the company's property, and that an order from the commission which appeared to be unfair to the company might be followed by a long and expensive law suit.

#### Defeat Municipal Light Plant Proposition.

Phoenix, Ariz.—The voters of Phoenix have decisively defeated the proposition for the issuance and sale of city bonds in the sum of \$600,000 for the purpose of acquiring, constructing and completing a municipal electric light and gas plant. The majority was 589, out of a total of 1,273 votes cast, with 342 voting for the bonds and 931 voting against them. The question submitted proposed that the indebtedness of the city be increased over and above the four per cent limit fixed by the state constitution. The issue would have been in denominations of \$100, or any multiple thereof, not exceeding \$1,000, payable in forty years and bearing interest at a rate not to exceed 4½ per cent.

#### Kansas Natural to Sell Out.

Pittston, Pa.—The complicated Kansas natural gas rate case has entered a new phase, plans for the sale of the Kansas Natural Gas Company, whose properties are chiefly in Kansas, having been announced here by John C. Bartlett, secretary of the Stockholders' Protective Committee. The committee had entered into a contract with Henry L. Doherty & Co., of New York, for the purchase of all stock at \$40 a share, provided the committee will have 40,000 shares deposited in a voting trust and provided Doherty & Co. can obtain from the public utilities commission of Kansas permission to carry out the plan. When the required number of shares are deposited with the Colonial Trust Company of Pittsburgh \$15 a share will be paid to the depositors and the remainder in 90 days with interest at 6 per cent. Doherty & Co. also are to pay the expenses of the committee. The Kansas Natural Gas Company source of gas is principally the wells of Kansas, although in recent years it has secured part of its supply from the Oklahoma fields.

Kansas City, Kans.—This transfer of the Kansas Natural Company's holdings to the Doherty interests will probably be followed by the sale also of the Kansas City Gas Company and the Wyandotte Gas Company. The purchase would probably solve the question of gas supply—next winter, at least—but not the price. The daily need of Kansas City is said to be 80 million cubic feet and the present outlook is for a supply of only 30 million from the Kansas Natural this winter. The Augusta-Eldorado field in Kansas is almost untouched. A pipeline is being constructed to tap that field to supply Wichita, Kans. When that is completed, the Oklahoma gas that now is going to Wichita can be diverted to Kansas City, St. Joseph, Mo., and other Northern customers. Turning in of that gas will help, but to get it all here compressor stations will have to be built. These cannot be installed in less than

from four to six months, engineers say. No pipelines will have to be built to make the Doherty gas from Oklahoma available. The Doherty pipeline and the Kansas Natural main line for fifty miles across Southern Kansas lie side by side. "Cutting over" will be a simple operation. The Doherty interests, through the Cities Service Company, hold forty-four subsidiary companies with total assets of \$223,000,000.

Meanwhile, the hearings before Judge Booth in the Federal Court here continue. Testimony to shift the responsibility for the weak supply of gas was introduced. Through V. C. Jarboe, superintendent of distribution, the company hoped to show that much of the shortage was caused by leakage in the distributing mains of the local companies. That a supply of more than 200,000,000 cubic feet of natural gas a day is available from the Osage Nation, of Oklahoma, for the Kansas Natural Gas Company was the testimony given by R. H. Bartlett, treasurer of the Oklahoma Natural Gas Company. He told also that another supply of 40,000,000 cubic feet daily could be obtained at a cost of 7 cents a thousand. Mr. Bartlett's testimony was to the effect that the cost of gas was advancing, and that well owners were entitled to larger amounts. He declared the Kansas company would be forced to extend its lines into the Osage country, as the available supply near its present lines soon would be exhausted.

#### Power Sale Limited to Territory.

Pittston, Pa.—An electric railroad company cannot sell its electric power for lighting purposes and a lighting company chartered to conduct business in a certain district cannot sell its commodity in another district. These decisions have been handed down by the supreme court, in the cases of the Citizens' Electric Illuminating Company of Pittston against the Lackawanna & Wyoming Valley Power Company and the same plaintiff against the Lackawanna & Wyoming Valley Railroad Company. Some time ago the Lackawanna & Wyoming Valley Power Company began to sell electricity to the Pennsylvania Coal Company at its colliery in Inkerman, Jenkins township. The Pittston Light Company instituted injunction proceedings holding that the power company was chartered to do business in Scranton and therefore was without the legal right to sell its commodity in Jenkins township. Judge Strauss granted an injunction which was made permanent. In the other case the Lackawanna & Wyoming Valley Railroad Company, the Laurel line, began to sell electricity in Jenkins township and the Pittston Light Company started injunction proceedings.

#### City Has No Right to Force Company Testimony.

St. Louis, Mo.—In a long opinion submitted to chairman Edward Scholl of the special committee of the board of aldermen appointed to investigate the so-called gentlemen's agreement of mayor Kiel with the Laclede Gaslight Co., by which the price of gas was reduced from 80 to 75 cents per 1,000 cubic feet, city counselor Daves holds that the board of aldermen is without authority to compel the officers of the gas company to testify before the committee. The opinion further holds that the public service act passed by the state legislature several years ago deprived the city of St. Louis, or any city in Missouri, of the right to fix rates or regulate service of public utility companies, a right that was vested in the Public Service Commission. The committee called for the opinion following the granting of permission by mayor Kiel to change the standard of lighting efficiency from a candlepower to a heat-unit test.

#### Thermal Unit Standard Adopted.

Albany, N. Y.—An order fixing heat units instead of candlepower in the standard of value for gas has been made by the public service commission of the second district, thus disposing of a problem which has been before the commission for a number of years. The order now provides that all companies in the state making more than 20,000,000 cubic feet of coal gas, water gas, or mixed coal and water gas a year must adopt the new standard before Jan. 1. This takes in all of the large companies. The smaller companies may come in under the new standard if they so choose. Their product must average 585 British thermal

units per cubic foot instead of sixteen, eighteen, or twenty candlepower as heretofore. While the demands of the consumer were shown to be tending toward a heating power standard, the commission found that it was becoming increasingly difficult for the companies to maintain gas at the old lighting power standard. To do so the gas had to be enriched by oils once cheap and plentiful, but now high priced and scarce on account of the growing demand for gasoline and allied products for motors and other purposes. It was further found that in transmitting gas over the increasing distances required by growing communities the enriching element was lost in transmission, thus making long-distance transmission difficult and expensive and uniform distribution impossible. The only difference which the consumer will notice will be that the gas will be more uniform, and that mantles and burners, less subject to deposits of carbon and other foreign matter, will have a longer, efficient life. The commission, it is said, has found that the methods of measuring heat units are more practical than those for gauging candlepower. The heating power standard set is such as to assure practically the same quality of gas as at present supplied under the candle-power measurement.

#### Franchise, Not Complied With, Not Revoked.

Hackettstown, N. J.—Disposing of an application presented by Charles B. Brady in behalf of Hackettstown, the board of public utility commissioners have declined to revoke a franchise granted to the Hackettstown Gas Company about three years ago. The effect of the decision is to continue the present status of the company in Hackettstown, the board having previously refused to approve the exercise of the franchise until the company submitted plans for a plant and indicated its readiness to begin operations. The mayor and council of Hackettstown sought to have the franchise canceled because the company had taken no steps looking to furnishing gas in the municipality. By an oversight the franchise ordinance failed to stipulate the time within which the company must be operating. Commissioner John J. Treacy pointed out that it was not the practice of the board to set aside franchises granted by municipalities. In view of the fact that the gas company had taken no steps to operate under its franchise, Mr. Treacy remarked there is nothing to prevent any other gas company from coming into the field, provided the municipality grants it a franchise and the company establishes to the satisfaction of the board that it will construct a plant.

## FIRE AND POLICE

#### Research Report Against Two Platoons.

San Francisco, Cal.—Advocating the retention of the single platoon system in the fire department, on the grounds of greater cost of the two-platoon plan, the municipal research survey, just reported on by the New York Bureau of Municipal Research, advises the elimination of the present charter provision, under which the number of firemen in each company is arbitrarily fixed. The survey holds that this charter provision has resulted in extra cost, as whole new companies have been created on paper in order to evade its intention. Of the two platoon propaganda the survey says: "In considering whether a fire department shall be organized on the single or two-platoon plan, the principal question is whether the citizens are willing to expend more money for fire protection. As to the efficiency of the force being increased or decreased by reason of a change from the single to the two-platoon system, it can safely be asserted that little or no change in the working efficiency of the force is effected. The agitation for the adoption of a two-platoon system is general throughout the fire department of the United States. In the cities which have already adopted the two-platoon system, in almost every instance it has resulted in greatly increasing the cost. It is contended that if all of the apparatus of the department were completely motorized, it would be possible to reduce the number of fire companies from 77 to 68 and by a rearrangement of the companies and a redistribution of the forces, the two-platoon system could be introduced without the appointment of additional

men and in this way the two-platoon system could be operated without any added cost to the city. Assuming that the contention of the advocate of the two-platoon system with respect to the reduction in the number of companies and the rearrangement of the remaining companies is practicable, the very fact that with the large reduction of the companies as recommended there would be no decrease in the total operating expenses, means that the adoption of the two-platoon system would, in effect, produce an increased cost of operation per unit. Wholly aside from the question of platoon system as already pointed out in this report, the number of fire companies in the city of San Francisco is excessive and unnecessarily large, so that without regard to whether a change in the hours of service is effected the number of companies should be reduced. It is pointed out by those urging the adoption of the two-platoon system that with its adoption the companies can be strengthened, but this can be done in the event of motorization without regard for what platoon system might be adopted and still allow for a substantial reduction in the force. If the single-platoon system is retained, the present plan of permitting the firemen one day off in five should be changed so as to allow all members of the force one day off in four." The survey finds that the organization of the fire department is "modern" and that "the supervision exercised over the force by the commanding officers may be said generally to be good"; but it is held that the number of officers is in excess of requirements, and should be reduced as vacancies occur.

#### Must Pay for Out-of-Town Fire Aid.

Albion, N. Y.—The companies of the Albion fire department owning motor trucks have established a rule not to respond to alarms in the surrounding country except where an agreement has been made to pay \$25 for the service. It has been customary for those calling one of the companies to contribute such an amount, but no fixed charge was made.

#### Big Fire in Car Works.

Butler, Pa.—One person was injured, 3,000 men were thrown out of employment and \$500,000 damage was done when fire, thought to have been caused by crossed wires, destroyed the power and electrical department of the Standard Steel Car Company here. Although the flames were confined to the power building, the entire plant will be crippled indefinitely, entailing an additional loss of \$500,000 in contracts and wages. The power department, a two-story brick building, 400 feet long, contained costly dynamos, electric controllers, electric motors and compressed air machines, all of which were destroyed. Nearly every department of the plant is run by either electricity or compressed air. A few of the smaller departments which depended on the power plant for lighting only were also closed. The entire Butler fire department played water on the blaze and confined the fire to the power building. This was the worst in Butler since the destruction of the same company's bolt and rivet department by fire eight years ago, when eighteen men lost their lives and forty were injured.

#### Police Chiefs Questioned on Civil Service.

Boston, Mass.—In an effort to get the opinion of the chief of police in each of the cities of the commonwealth as to the advisability of holding non-competitive examinations for the selection of policemen eligible for promotion, the civil service commissioners have sent to each of the chiefs a letter, requesting his views. The question has arisen because of a split in the state-controlled Fall River police board; two members of the board desire that four officers should be promoted to the rank of lieutenant, have selected the men whom they desire to promote, and have asked the commission to give these men a non-competitive examination. The chairman of the board, however, takes the position that no promotions are needed at the present time, but if they are to be made he contends that they should be the result of examinations open to all members of the department. The commission's letter states the three propositions presented to the board: whether it will continue to allow non-competitive examinations; whether it will allow competitive examinations among a certain number to be selected by the

chief of police; or whether it will open the examination to all applicants, that is, whether it shall be a general competitive examination among members of the police force.

## MOTOR VEHICLES

### To Install Municipal Garage.

Duluth, Minn.—A municipal garage is to be established at the fire department repair shop at the rear of the No. 3 firehall. Commissioner Silber, safety head, after an examination of the shop, found sufficient room for the storing of all the city's automobiles, in addition to establishing the proposed centralized repair and blacksmith shop. At present the city-owned cars are distributed all over the city and the establishing of a central garage, it is believed, will save the city hundreds of dollars annually in repair bills. Other repair work and blacksmithing is practically all handled at the fire department's shop, but the work will be centralized under the new plan. A complete equipment for repair work has been installed at the shop by the fire department, which was assisted by the division of utilities.

### Fire Truck Does Well in Test.

Crawfordsville, Ill.—The new American-La France fire apparatus made good in exciting tests. The large crowd was particularly pleased when a two-inch stream was sent over the top of the flagstaff on the court house. With a pump pressure of 200 pounds and 70 pounds at the 1 3/4-inch nozzle, 862 gallons a minute were delivered—112 gallons better than the requirements of the specifications. Mayor Murphy, the councilmen and the fire chief witnessed the tests. Among the guests of the city at the demonstration were mayor Cooper and councilmen Huffman, Allen and Crawley, of Greencastle; John Shultz, member of the board of works; C. M. Johnson, fire chief, and E. J. Vaughn, city clerk, of LaFayette; Mr. Severson, a member of the council from West LaFayette, and fire chief Henderson, of Frankfort.

### Commissioners Buy New Truck.

Manistee, Mich.—Purchase of a motor truck for the use of the fire department has been authorized by the city commissioners. The price of the truck is \$8,500 and is one of the latest designs of Seagrave combination pumping engine and hose cart. According to specifications, the truck will have a wheel base of 172 inches, will develop 102 horse power and have a capacity of 750 gallons per minute. The truck is equipped with a pump manufactured by the Manistee Iron Works and carries a complete equipment of chemicals, hose, ladders, etc., and other fighting tools. The new machine will also have a special arrangement which will permit the horse-drawn engine now owned by the department to be hooked to the rear of the truck for service in case of particularly large fires. The new machine will be delivered in February.

## GOVERNMENT AND FINANCE

### Haverhill Officials Acquitted.

Haverhill, Mass.—The jury in Salem which has been considering charges against Haverhill city officials because of a religious riot there on April 3 returned a verdict in which mayor Albert L. Bartlett was acquitted on one count and the jury disagreed on a second, both charging failure to suppress the disturbances. Charles H. Hoyt, commissioner of public safety, was acquitted on both counts. In the case of Albert E. Stickney, C. C. Cook and Roswell L. Wood, the jury disagreed. The jury's report followed deliberation extending over nineteen hours, which was begun at Lawrence, where testimony had been taken. The court was then transferred to Salem. The disorders out of which the indictments of the city officials developed occurred in connection with an attempt by Thomas E. Leyden, of Somerville, to speak at the Haverhill city hall on the Roman Catholic Church's attitude toward public schools. Testimony showed that the meeting was interrupted frequently by persons in the audience and eventually aban-

doned when Leyden was unable to obtain order. The lecturer himself fled and was in hiding all night while the crowd rioted about the city in an effort to locate him. An effigy marked "free speech" was burned, windows were stoned at city hall and elsewhere, and the homes of persons believed to be sympathizers with Leyden's propaganda were attacked. The police made few arrests, and a militia company was ordered out. Testimony developed that Mayor Bartlett had read the "riot act" from the steps of city hall, and in a talk to the crowd had asked them to disperse. Commissioner Hoyt, as executive head of the police department, was said in testimony to have taken various measures to restrain the crowd. Other indictments are standing against four men who are charged with inciting riot.

### County Officials Indicted.

Belvidere, N. J.—Indictments against every member of the Warren county board of freeholders, against Fred W. Salmon, the county engineer, and against John H. Dahlke, the county attorney, have been handed in to judge Joseph M. Roseberry by the Warren county grand jury. There are exactly forty indictments as an outgrowth of the probe of the freeholders conducted by former judge Frederick W. Gnichtel of Trenton, sitting as a supreme court commissioner. Most of the charges against the freeholders are for exceeding appropriations. Serious charges of overcharging the county have been made in the probe against Mr. Salmon, the county engineer. Some of the freeholders were found to have overcharged the county in bridge inspection work. At the probe of the freeholders, Mr. Gnichtel took testimony for sixteen days, which showed that the finances of the county had been laxly administered, and the Gnichtel report was made the basis of a strong charge to the inquest by justice Trenchard, who instructed the jury to bring in indictments.

### May Use County Funds to Prosecute Officials.

Price, Utah.—County commissioners in Utah may use public funds in prosecuting officials charged with failing to perform their duty. This is the substance of the decision handed down by the supreme court of Utah at Salt Lake City in reversing the court of Carbon county and remanding for a new trial the case of Carbon county, respondent, against William T. Hamilton, Benton Randolph, Joseph R. Sharp, county commissioners, and their bondsmen and bonding companies. Carbon county, as a corporation, brought the suit against these defendants to recover money alleged to have been disbursed without legal authority. In answering, the defendants said that in 1912, 1913 and 1914, C. C. McWhinney was county attorney and Thomas F. Kelter was county sheriff. The defendants alleged that these officers had failed to prosecute gambling and gamblers which they said were active, although the commissioners had requested these two officials take action. The commissioners stated that they had appealed to the state attorney for aid without avail. In the premises the county commissioners then directed one George N. Hill to institute proceedings in his name both against the county attorney and the sheriff. The county attorney was of necessity disqualified, so the commissioners employed counsel and paid the attorneys from the county funds. Carbon county filed a general demurrer to the answer, and the district court sustained the demurrer and entered judgment against the defendants, who thereupon appealed to the supreme court.

### New York's Biggest Budget.

New York, N. Y.—The city tax budget for 1916, which has been signed by mayor Mitchel, controller Prendergast, and other members of the Board of Estimate, calls for \$211,115,016.82. The figures as finally made public show an increase of \$12,133,861.01 over the 1915 budget, which, without the city's share of the direct state tax of \$13,975,021.73, amounted to \$198,981,155.81, and is by far the largest budget for the city and county expenses in the history of the city. According to the city officials, the annual tax increase will be only a fraction of one per cent. The mayor has stated that the total appropriations for the departments under his immediate jurisdiction are less by \$1,737,-

067.54 than the total for those departments when the present administration took office in 1914. The controller has explained that the increase budget is due principally to the following increases in these items:

Debt service .....	\$6,500,000
Education .....	1,565,000
Child welfare, (widows' pensions) .....	1,282,000
Tax deficiencies .....	1,000,000
Mandatory yearly salary increments in Police, Fire, City College, Correction, Street Cleaning, and Education Departments .....	1,000,000
Total.....	\$11,347,000

The controller said: The total appropriations for the mayor's departments for 1917 are \$59,057,576.83, as compared with \$58,316,437.95 for 1916, an increase of \$741,138.88. If, however, we except the increases in the police and fire departments, aggregating \$795,100, due in the police department to additional patrolmen and sergeants and salary increases to first-grade patrolmen, captains and inspectors, and in the fire department to salary increases to first-grade firemen and engineers of steamers, the net reductions as compared with the 1916 budget would be \$53,961.12. The increase of \$6,500,000 in debt service is due principally (1) to the maturing of \$2,500,000 bonds of the municipalities in Queens County, issued prior to consolidation, for which no sinking fund was established; (2) to \$1,000,000 included for interest on rapid transit bonds for that portion of the new subways put into operation; (3) to \$1,000,000 for the redemption of serial bonds; (4) to \$875,000 additional for the redemption of special revenue bonds; and (5) to \$500,000 additional for the instalments due to the sinking fund of the City of New York. The increase in the appropriation for tax deficiencies is due to taxes deemed to be uncollectable, because found to have been laid against land in the beds of streets and taxes erroneously levied against special franchises and real estate corporations substantially all of which was already taxed against special franchises.

## MISCELLANEOUS

### Power Company Builds City's Beach.

Niagara Falls, N. Y.—City manager Carr has received from Paul A. Schoellkopf, general manager of the Hydraulic Power Company, a detailed statement of the cost of building the municipal bathing beach at Porter Park. The work was done by the power company. Under the city's contract with the company the company was to receive 15 per cent of the cost of the work if the \$5,000 appropriation would permit. As the work cost \$4,927.28 the power company will get only about 1½ per cent for its services. The power company did the work with its own equipment and supplied material at cost. It charged nothing for the services of its engineers.

### Commission Against Telephone Competition.

Woodward, Okla.—A recent opinion by the corporation commission gives emphatic views as to the public interest in more than one telephone exchange in a community. The case came from Woodward and vicinity, where the Fort Supply Telephone and Telegraph Company complained of the Pioneer Telephone and Telegraph Company for reducing rates. Both the companies serve Woodward and Forgan and intermediate towns. The Pioneer some time ago reduced its rates to \$1 for either business or residence telephone service. The former rate by both companies had been \$2 and \$1.25, respectively, for business and residence service. Complaint is made that the Pioneer had cut the rate in order to stifle competition and maintain a monopoly. The Pioneer was the first company in the field at Forgan. The commission denied the relief, saying: "The commission hereby adopts the policy that where there is a telephone exchange already in a town and a second exchange is put therein it enters the field at its peril. The commission will afford it no relief against the original company which enters the field first in cutting rates even below a reasonable return on the investment. But where a second company enters a field already occupied by a telephone utility the commission will not permit it to reduce rates so low as to destroy the property of the company which built the first exchange. The same rule will apply to long-distance lines."

## LEGAL NOTES

### A Summary and Notes of Recent Decisions— Rulings of Interest to Municipalities

#### Limitation of Indebtedness—Rights of Abutting Owners to Enjoin Payment of Assessment.

South Park Floral Co. v. City of New Castle et al.—Although a contract for municipal street improvements created an indebtedness in excess of the constitutional limit, abutting property owners who are liable for their proportion was void and uncollectable.—Supreme Court of the collection of such assessment, although the city's proportion was void and uncollectable.—Supreme Court of Indiana, 113 N. E. R., 5.

#### Liability of Municipal Corporations.

City of Kokomo v. Loy.—Municipal corporations are not liable for negligent acts in their political or governmental capacity, and are liable for their own negligence as corporations distinct from the governmental power, and the test of liability is not the nature of the tort, the relation between the city and person injured, or whether the city was engaged in the management of tangible property, but the capacity in which the city was acting at the time.—Supreme Court of Indiana, 112 N. E. R., 994.

#### Duty to Call Election—Expense.

State v. Bentley, Mayor.—The fact that a city government did not take into account the contingent expense of possible special elections in making its financial budget, and that it has no money set apart to defray the expense of such an election, will not excuse a mayor from the performance of his statutory duty to call a special election when the proceeding precedent to the demand for his official action are regularly certified to him.—Supreme Court of Kansas, 157 P. R., 1197.

#### Dangerous Work—Liability of Contractor and City.

Taylor v. Walsh.—Where defendant, as an independent contractor for the construction of a public sewer, in doing necessary blasting for excavation in a proper manner, caused vibrations which damaged plaintiff's house, the work being of an intrinsically dangerous nature, both the city and the independent contractor may be held liable for the damages, and liability cannot be avoided by the independent contractor on the plea that it was done at the instigation or request of another.—Kansas City Court of Appeals, Missouri, 186 S. W. R., 527.

#### Assessments and Reassessments.

Eggerth et al. v. City of Spokane.—The sole criteria of the validity of a reassessment or supplemental assessment roll (aside from the limitation to 50 per cent of the assessed valuation for taxation of the property in the new district) are that its aggregate shall not exceed the actual costs and expense of the improvement and the accrued interest thereon, less any sums paid under any former assessment, and that it shall be equitably distributed upon all the property specially benefited by the improvement in proportion to such benefits.—Supreme Court of Washington, 157 P. R., 859.

#### Indebtedness—Authority of Officers—Bonds—Taxation.

Benjamin et al v. City of Mayfield et al.—Where, under a contract with a water company, a city had authority to pay charges which necessitated a levy in excess of Const. §§ 157, 158, which were subsequently adopted, or was bound to purchase the plant, the municipal officers have the discretion in determining which alternative they will pursue; Ky. St. § 3490, subsec. 2, providing that in addition to the levy authorized by the Constitution a tax not exceeding 100 cents on the \$100 may be levied for the payment of pre-existing debts, while sub-section 26 declares that a city having an indebtedness contracted previous to the adoption of the Constitution may issue renewal or funding bonds, provided the bonds shall not exceed the principal of the bonded and floating debt.—Court of Appeals of Kentucky, 186 S. W. R., 169.

## THE MUNICIPAL INDEX

In Which Are Listed and Classified by Subjects All Articles Treating of Municipal Topics Which Have Appeared During the Past Month in the Leading Periodicals.

It is our purpose to give in the second issue of each month a list of all articles of any length or importance which have appeared in all the American periodicals and the leading English, French and German ones, dealing more or less directly with municipal matters. The Index is kept up to date, and the month of literature covered each time will be brought up to within two or three days of publication. Our chief object in this is to keep our readers in touch with all the current literature on municipal matters. In furtherance of this we will furnish any of the articles listed in the index for the price named after each article, except that where an article is continued in two or three issues of the paper, the price given is for each of said issues. In addition to the titles where these are not sufficiently descriptive or where the article is of sufficient importance, a brief statement of its contents is added. The length also is given, and the name of the author when it is a contributed article.

## ROADS AND PAVEMENTS.

## Highways:

The Location of Highways. Extracted from a paper by James Allen, state highway commissioner of Washington. 1,000 words. Good Roads, October 7. 10 cts.

The Highway Situation in Texas. Organization of departments under which roads are being constructed. Lack of a highway department felt. By R. L. Morrison. 4 ills., 1,750 words. Good Roads, October 7. 10 cts.

## State:

Highways of the State of Oregon. Important trunk roads, road policy and classification of roads. Road law. By John H. Lewis, state engineer. 4,000 words. Better Roads and Streets, October 15 cts.

Highway Improvement in Kentucky. Types of roads being built and methods of construction. Bridges. By Rodman Wiley, commissioner of public roads. 4 ills., 1,500 words. Good Roads, October 7. 10 cts.

Last Year's Accomplishments of the Division Engineers of the Department of Construction of the New York State Commission of Highways. A summary of the work done during 1915. By Geo. D. Steele. 4,000 words. Better Roads and Streets, October 15 cts.

Safety Provisions in Massachusetts Road Work. 4 ills., 500 words. Good Roads, October 7. 10 cts.

Report of the California State Highway Commission. Statistics of the work done up to April 15, 1916. 1,500 words. Pacific Municipalities, October 25 cts.

## Construction:

A Light Power Shovel for Road and Street Grading. The ninth of a series of articles on road and street grading. By Daniel J. Hauer. 1,000 words. The Contractor, October 1. 20 cts.

Building the Storm King Road. Alpine road methods are employed in the construction of a new road along the west bank of the Hudson river near West Point. 4 ills., 1,100 words. Engineering News, September 28. 15 cts.

New Methods and Progress on Twin Peaks Tunnel. Latest report from the new highway tunnel under construction in San Francisco. By A. J. Cleary, assistant city engineer. 5 ills., 1,000 words. Engineering News, October 5. 15 cts.

Maintenance:

Earth Road Maintenance in Hopkins County, Kentucky. 800 words. Engineering and Contracting, October 4. 10 cts.

County Road Construction and Maintenance. Abstract of the talk given by J. C. Dayton before the New York State Association of County Highway Superintendents. 3,500 words. Better Roads and Streets, October 15 cts.

Importance of Maintenance in Selecting Pavements. Repair and maintenance too seldom in competent hands. Maintenance should be in hands of engineer who constructed the road. By Clarence D. Pollock. 1,000 words. Municipal Journal, October 12. 10 cts.

Preparing the Pavement for Final Acceptance. Method of making repairs on an asphalt pavement at the expiration of the 10-year guarantee period. By Stanley E. Bates. 6 ills., 1,000 words. Contractor, October 15. 20 cts.

Pavements:

Street Paving in 1915 in Manhattan Boro, New York City. Pavement laid, cost per square yard and construction details. 1,500 words. Engineering and Contracting, October 4. 10 cts.

Width and Final Development of Paved County Highways Suited to Western Washington. Abstracted from paper by R. H. Thompson. 2,000 words. Engineering and Contracting October 4. 10 cts.

Pavement Damage Calls for Truck-Weight Restrictions. E. W. Stern discusses injury to asphalt and granite block by New York subway construc-

tion hauling. 3 ills., 1,500 words. Engineering Record, October 21. 15 cts.

## Asphalt:

Portable Asphalt Plants for County Roads and City Streets. Describes the various plants which are suitable for laying this type of pavement. The first in a series of articles. This one describes the Warren portable plant. By Geo. D. Steele. 3 ills., 7,500 words. Better Roads and Streets, October. 15 cts.

Asphaltic Concrete Paving at Oak Park, Ill. Methods and experience in pavement construction in a residential suburb of Chicago. 1,500 words. Engineering News, October 26. 15 cts.

"Wide-Open" or Alternate Asphalt Specifications. Letter from D. T. Pierce of the Barber Asphalt Paving Company concerning the adoption of specifications by the A. S. M. I. 3,500 words. Municipal Journal, October 26. 10 cts.

## Bituminous:

Bituminous Macadam and Bituminous Concrete Pavements. The latest opinions of recognized authorities on the materials and methods requisite for the successful construction and maintenance. By Arthur H. Blanchard. 8 ills., 6,500 words. Municipal Journal, October 5. 25 cts.

Bituminous Wearing Surfaces for Old Macadam. Mixing and laying Amesite in Connecticut and New York. Resurfacing a Boston street with bitulithic and New Jersey roads with Warrenite and National pavement. Laying Bitoslag in Pennsylvania. 10 ills., 6,500 words. Municipal Journal, October 5. 25 cts.

## Brick:

Brick Roads. Abstract from bulletin No. 373, issued by the Department of Agriculture, Washington, in which the authors call attention to the essential features to be noticed when laying brick pavements. The article deals with curbing, foundations and joint filling, while special reference is made to the necessity for thorough drainage, firmness, uniformity of grade and adequate shoulders. By V. M. Peirce and C. M. Moorfield. 2,800 words. Canadian Engineer, September 28. 15 cts.

Monolithic Pavement in Vermilion County, Ill. Brick are laid directly on concrete base. The thin layer of sand and cement has been discarded. Brick are grouted immediately after rolling is completed. By Harlan H. Edwards. 7 ills., 2,500 words. Engineering Record, September 30. 15 cts.

Building a Monolithic Brick Road. This article describes construction methods developed in building this type of roadway. By Stanley E. Bates. 10 ills., 1,750 words. The Contractor, October 15. 20 cts.

Recent Developments in Brick Pavement Construction. Laying brick directly on green concrete foundation is recommended by National Paving Brick Manufacturers' Association. Proper mode of construction by double template is described in detail. Slab board methods. By Maurice B. Greenough. 4 ills., 3,000 words. Municipal Journal, October 5. 25 cts.

Street and Road Pavements. The second of a series of articles. This one is devoted to the subject of brick pavement construction, assuming that the concrete base or other foundation has already been laid. By Charles C. Brown. 10 ills., 9,000 words. Municipal Engineering, October. 25 cts.

New Specifications of National Paving Brick Manufacturers' Association for Brick Pavement of Green Concrete and Sand-Cement Super-Foundation Types. 2 ills., 1,250 words. Engineering and Contracting, October 4. 10 cts.

## Concrete:

Experiments with Concrete for Road Resurfacing. In Wayne County, Mich. Three-inch reinforced surface was laid on six-year old pavement after sprinkling with hot tar. 1,000 words. Engineering Record, October 7. 15 cts.

The Coleman DuPont Road in Delaware. Description of road, methods of construction, materials used, etc. By C. M. Upham, chief engineer. 3 ills., 2,000 words. Good Roads, October 7. 10 cts.

Should Wider Joints Be Provided in Concrete Roads Laid Late in the Season? Heaving of slabs on Canadian highway project causes noticeable jar to traffic on 6 per cent of more than 2,000 joints in last year's work. By H. S. Van Sococ. 2 ills., 1,250 words. Engineering Record, October 14. 15 cts.

Easton-Bethlehem Concrete Highway. Effort by State Highway Commission of Pennsylvania to construct model road 12 miles long. Tests were made to determine most effective mix and time of mixing. Measuring expansion, contraction and vertical movement. By John McNeal. 5 ills., 2,500 words. Municipal Journal, October 5. 25 cts.

Earth Road Construction in Box Elder County, Utah. 4 ills., 650 words. Engineering and Contracting, October 4. 10 cts.

## Granite Block:

Filling Joints in a Granite Block Pavement on a Road in Bergen County, N. J. By Henry W. Durham, county engineer. 4 ills., 1,800 words. Good Roads, October 7. 10 cts.

Granite Block on a County Road. Used on a five per cent grade on a New Jersey highway. Shallow blocks with grout filler were laid on 4-inch concrete base. By Garwood Ferguson. 1 ill., 1,500 words. Municipal Journal, October 5. 25 cts.

Motor Trucks Ruin Improved Granite Block Pavement. New pavement on 42nd Street, New York City, broken up by very heavy truck traffic. 6 ills., 1,000 words. Engineering News, October 12. 15 cts.

Repaving in Cincinnati. Removing old granite block and replacing with same blocks repaved and with other paving materials. Rolling stone blocks. Both pitch and grout joints were used. Tar sand filled for wood block. By John S. Crandall. 5 ills., 1,500 words. Municipal Journal, October 12. 10 cts.

## Gravel:

Disintegrated Gravel, 1,000-Mile Tour Shows Is Best Natural Highway Material in Colorado. Large mileage is constructed from metal along the roadside. Most important elements in maintenance are adequate drainage and sloping of surface downward toward uphill side. By W. W. De Berard. 8 ills., 3,500 words. Engineering Record, October 14. 15 cts.

## Macadam:

Crushed Stone Road Cost \$3,500 to \$4,500 per Mile. Small first cost and maintenance necessary in Indiana. Highways have life of 15 or 20 years. By R. L. Longshore. 2 ills., 1,000 words. Engineering Record, October 7. 15 cts.

## Sand Clay:

Sand-Clay Roads. Method of construction described. Excellent roads where traffic is not too heavy and except during protracted wet weather. By John McNeal. 1,000 words. Municipal Journal, October 5. 25 cts.

## Wood Block:

The Treatment of Wood Paving Blocks. Discusses thoroughly the subject, giving particular attention to the method of treatment, rather than to the properties of the oil. Maintains that care used and method of handling blocks determines to a large extent the ultimate durability of the pavement. By Clyde H. Teesdale. 7 ills., 4,000 words. Canadian Engineer, October 26. 15 cts.

## Finance and Cost:

Cost Data on 1,170 Square Yards of Asphaltic Macadam by Day Labor at Waynesboro, Pa. 1,000 words. Engineering and Contracting, October 4. 10 cts.

Cost of State Aid Roads in Michigan. Discusses the cost of road construction, which has increased during the past few

years, and describes the types of road built. 2,500 words. *Better Roads and Streets*, October. 15 cts.

**The Cost of a Road.** Elements to be considered in computing the cost of a road. Annual cost is important. By Robert Irmes. 1 ill., 3,500 words. *Southern Good Roads*, October. 10 cts.

#### Miscellaneous:

Distribution of Traffic on a Rectangular System of Road Analyzed. In any large area 80 to 85 per cent of all traffic is carried by 15 or 20 per cent of the road, and expenditures should be made accordingly. By E. W. James, Office of Public Roads & Rural Engineering. 2 ill., 3,000 words. *Engineering Record*, October 7. 15 cts.

Strength of Brick and Concrete Highway Surfacing. By LeRoy W. Allison. 1 ill., 1,000 words. *American City*, October. 50 cts.

**The Federal Aid Road Act.** Abstract of the rules and regulations for carrying out the provisions of this act as drawn up by the Secretary of Agriculture. 1,250 words. *Municipal Journal*, October 5. 25 cts.

Rules and Regulations for the Prosecution of Highway Work with Federal Aid. A very complete article. 4,000 words. *Good Roads*, October 7. 10 cts.

Rules and Regulations for Carrying Out the Federal Aid Road Act. 1,500 words. *Engineering and Contracting*, October 4. 10 cts.

## SEWERAGE AND SANITATION.

#### Treatment:

Activated Sludge Sewage Treatment. Experiments being conducted and results obtained at eleven plants. Provision for cooperation of experimenters. Abstract of several papers presented before American Society of Municipal Improvements. 5,000 words. *Municipal Journal*, October 26. 10 cts. Latest information concerning Milwaukee experiments. Air diffusion and diffusers. Sedimentation, sludge disposal and treatment of tannery wastes. 4,500 words. *Municipal Journal*, October 26. 10 cts.

Activated Sludge Process in Treatment of Tannery Wastes. Results of experiments and equipment of experimental plant. Methods of treatment. By Harrison P. Eddy and A. L. Fales. 3,500 words. *The Surveyor*, September 29. 40 cts.

Large Activated Sludge Plant at Milwaukee, Wis. Layout, details of design and rates on operating experience of the plant for treating part of the sewage in Milwaukee, in the presence of activated sludge. 8 ill., 1,400 words. *Engineering News*, October 12. 15 cts.

Aeration Suggested for Disposal of Sludge. George T. Hammond discusses problems of activated process of sewage treatment. 1,700 words. *Engineering Record*, October 7. 15 cts.

Sewage Treatment by Aeration and Activation. Development of the activated sludge process, with details of layout, construction and operation of the experimental station at Brooklyn, N. Y. By Geo. T. Hammond. 6 ill., 5,000 words. *Canadian Engineer*, October 19. 15 cts.

Sewage Works and Outfall for Lakewood, Ohio. A treatment plant consisting of bar screens, grit chambers, Imhoff tanks, sludge beds and chlorine apparatus. 2 ill., 500 words. *Engineering News*, October 26. 15 cts.

Wash-Upon-Dearne Sewerage and Sewage Disposal Scheme. Method of treatment and description of work. Sewage pumping. By J. H. Drew. 2 ill., 2,500 words. *The Surveyor*, October 6. 40 cts.

Cameron Septic Patents Expired this Week. Status of infringement claims against Imhoff tanks discussed in light of recent developments. By Geo. W. Fuller. 1,000 words. *Engineering Record*, October 7. 15 cts.

Sewage Disposal and Water Supply in Canada. From the *Contract Record*. 2,500 words. *The Surveyor*, September 8. 40 cts.

Successful Sewage Disposal by Broad Irrigation. About 1,600 acres are irrigated at San Antonio, Texas. The city delivers the sewage without charge on either side to a company which distributes it to users, storing the wet weather surplus in a lake. By Terrell Bartlett. 5 ill., 1,200 words. *Engineering News*, September 28. 15 cts.

#### Pumping:

Building Albany Sewage Pump House and Grit Chamber. Constructing pump house was an interesting caisson-sinking job. By Stephen B. Vernon. 8 ill., 1,500 words. *Engineering News*, October 19. 15 cts.

Brooklyn Adds an Automatic Sewage Pumping Station. By Louis W. Gersoni. 40 cts. 4 ill., 1,700 words. *Engineering News*, October 26. 15 cts.

#### Sewers:

Completion of the Sewage System of Baltimore. Notes and views outlining \$23,000,000 worth of sewers and sewage treatment works by G. J. Requardt. 3 ill., 600 words. *Engineering News*, October 19. 15 cts.

Aids to Estimating the Cost of Vitrified Pipe Sewers. Empirical formula, tables and diagrams based on experience and weighting of variable conditions. By W. G. Kirchoffer. 1 ill., 1,500 words. *Engineering News*, October 26. 15 cts.

Some Ideas in Sewer Work. Efficiency of canvas covers for joints, protection against settling and protection for soft ground. By W. G. Cameron, Canadian Engineer. 4 ill., 1,200 words. *The Surveyor*, September 8. 40 cts.

Hollow Tile Sewers Built at Clinton, Ia. Details of construction methods in building segmental block sewers in rock excavation. 2 ill., 800 words. *Engineering News*, October 5. 15 cts.

Some Features of Sewer Design. By E. S. Spencer. 1,500 words. Bulletin of the Affiliated Engineering Societies of Minnesota. 20 cts.

Submerged Sewer Outlet in Harlem River, New York. Brick sewer and concrete chamber were constructed in simple coffer dam. Lowering depressed outlet from guide piles. 3 ill., 1,250 words. *Engineering Record*, October 1. 10 cts.

Prevention and Removal of Deposits from and Repairs to Sewers. By Henry A. Cutler. 2,500 words. *The Surveyor*, October 13. 40 cts.

Backfilling a Large Sewer Trench at Night. Describes how a large contract job was speeded up by adding a night shift on part of the work, portable acetylene lights furnishing the illumination. Two lights were used. 1 ill., 1,000 words. *The Contractor*, October 1. 20 cts.

Chicago's Bubbly Creek will Bubble No More. Conduit is being constructed to carry away sewage and trade wastes. 3 ill., 1,300 words. *Engineering News*, October 19. 15 cts.

#### Sludge By-Products:

Fertilizer From Sewage Sludge. Amount of nitrogen contained in various sludges. Feasibility and cost of dewatering sludge. Yeast fermentation process. Cost and returns. 2,750 words. *Municipal Journal*, October 12. 10 cts.

Nitrogen Recovery from Sludge Reaches Commercially Practicable Stage. Sludge from the activated process of sewage treatment contains more than twice as much nitrogen as that found in sludges from other tanks. Dried sludge has a market value of \$9 to \$15 per ton and the cost of placing on the market is \$8 to \$12 per ton. From a paper by W. R. Copeland. 2,500 words. *Engineering Record*, October 7. 15 cts.

Nitrogen from Sewage Sludge—Plain and Activated. From a paper by William R. Copeland, with discussion by Geo. W. Fuller and others. Review of possibilities and difficulties with special reference to the Milwaukee studies. 3,000 words. *Engineering News*, October 5. 15 cts.

Dewatering of Sludge the Big By-Product Problem. Discussion by George W. Fuller on the recovery of nitrogen from sewage sludge. 2,000 words. *Engineering Record*, October 7. 15 cts.

#### Miscellaneous:

The Pollution of New York Harbor and the Remedy. By Kenneth Allen. 2 ill., 7,500 words. *Municipal Engineers Journal*, October. 50 cts.

Building 600 Miles of Drainage Ditches. Dipper dredges were used to make cuts with 1:1 slopes. Motor boats and motor scows used for transportation. 4 ill., 2,300 words. *Engineering News*, October 19. 15 cents.

## WATER SUPPLY.

#### Waterworks:

Water Supplies. Sources of supply: wells, springs, rain water, rivers and streams, lakes, etc. Filtration and purification. By Major W. S. McCullough. 4,000 words. *Municipal World*, October. 10 cts.

Notes on the Melbourne Water Supply. Source of supply and design and construction of pipes, tunnels and works. By E. G. Ritchie. 10 ill., 5,000 words. *Water & Water Engineering*, September 15. 35 cts.

Water Supply in the South Yorkshire Coal Field. Describes the waterworks system, source of supply and method of purification. By J. H. Drew. 4,000

words. 2 ill. *The Surveyor*, October 6. 40 cts.

The Baltimore Water Supply. By Bosley Thomas. 2,000 words. *Journal of the Engineers' Club of Baltimore*, September. 25 cts.

#### Purification:

Filtered Water Supply for Sacramento is Recommended. Filtered water supply is considered most satisfactory and economical. Features include a novel head house with drainage and spent wash water sump, below and storage tank on top. 2,000 words. *Engineering Record*, September 30. 15 cts.

Cleveland's Water Supply to be Purified and Softened. Bacteria and turbidity will be removed and incidentally a not very hard water softened by lime treatment, coagulation with sulphate of iron and mechanical filtration. 6 ill., 2,000 words. *Engineering News*, October 19. 15 cts.

Cost and Use of Chemicals at Purification Plant at St. Louis, Mo. 2,000 words. *Engineering & Contracting*, October 11. 10 cts.

Experiences in Tuning Up St. Louis Filters Indicate What Will Not Work. Brewery hose and lead pipe are not affected by chlorine or coagulant chemicals. High rate of wash does not eliminate mud balls. 1,750 words. *Engineering Record*, October 28. 15 cts.

Experience at Springfield, Mass., in the Application of Coagulant Intermittently and in Excess Amounts. From a paper by E. E. Lochridge. 1 ill., 2,000 words. *Engineering and Contracting*, October 11. 10 cts.

Omaha Coagulant Plant Uses Improved Alum Process. Heat from lime slakers transferred to alum solution. 3 ill., 1,000 words. *Engineering Record*, October 7. 15 cts.

Application of Flour and Feed Blending Machine to Feeding Coagulant. Has generally given good service. By W. T. McClenahan. 4 ill., 2,000 words. *Engineering & Contracting*, October 11. 10 cts.

Application of Coagulant Intermittently and In Excess Amounts. From a paper by E. E. Lochridge, before the New England Waterworks Association. 1 ill., 1,500 words. *Canadian Engineer*, October 19. 15 cts.

**Pipe Lines:**  
The Aqueduct for the Greater Winnipeg Water District. Abstracts of papers dealing with the general features of constructions, methods adopted, progress of the work and engineering organization. By W. G. Chase and N. V. Sauer. 2,800 words. *Canadian Engineer*, October 12. 15 cts.

Winnipeg Aqueduct Cracks Can be Repaired Within Original Cost Estimate. Engineers suggest wider base and reinforced invert to prevent settlement of concrete conduit in bad ground. 1 ill., 2,500 words. *Engineering Record*, October 14. 15 cts.

New Winnipeg Aqueduct Cracks from Foundation Settlement. Extracts from reports of consulting engineer. 2,000 words. *Engineering News*, October 12. 15 cts.

Service Pipes. Discusses material used for connections and source of trouble. Size of service. The report of committee at New England Waterworks Association. 1,800 words. *Fire and Water Engineering*, October 4. 10 cts.

Waterworks Service Pipe. Abstract of recent report of committee of New England Waterworks Association. 2,500 words. *Engineering News*, September 28. 15 cts.

Cost of Laying Pipe in San Francisco. Cost data on laying gas distribution mains. Describes conditions encountered and details and factors which have to be considered. By D. E. Keppelmann. 5 pages. *American Gas Light Journal*, October 2. 10 cts.

Connecting Narrow Siphon to Staten Island Main. Connecting pipe laid in submarine trench excavated between sheet-piling line. Connections slid as unit on trench track and fitted by divers. 8 ill., 1,500 words. *Engineering News*, October 26. 15 cts.

Engineer Reports on Corrosion of 350-mile Australian Steel Pipe Line 12 Years Old. Greatest deterioration noted where conduit is buried in earth. Maintenance cost since 1902. 3,000 words. *Engineering Record*, October 21. 15 cts.

Leakage From Pipe Joints. Summary of replies to questionnaire sent out by American Waterworks Association. 1,500 words. *Engineering & Contracting*, October 11. 10 cts.

Leakage from Pipe Joints. Abstract of report at convention. 1,000 words. *Fire and Water Engineering*, October 4. 10 cts.

An English Admission of the Superiority of American Water Pipe. Recounts the advantages of the American product. 1,800 words. Engineering & Contracting, October 11. 10 cts.

**Reservoirs:**

The New Youngstown Reservoir. Description of plant. 4 illus., 1,100 words. Fire and Water Engineering, October 11. 10 cts.

Water Basin for City of Omaha Constructed by Day Labor, Using New Special Devices. Daily record of concrete materials used as basis for proportioning. Formed ties for steel reinforcements hold rods in place and effect economy. By Homer Krouse. 7 illus., 2,500 words. Engineering Record, October 28. 15 cts.

Every Possible Precaution Observed to Make Watertight Keechelus Reservoir, Washington. Impervious foundation, water-tight connection to embankment and enclosed stilling pond are features of design of dam. By C. E. Crownover, construction engineer. 2 illus., 3,000 words. Engineering Record, October 14. 15 cts.

Puddling and Rolling to Insure Impervious Foundation for Keechelus Reservoir. Embankment carefully constructed to make water-tight connection. Piling displaces concrete core in water bearing gravel. By C. E. Crownover. 4 illus., 2,250 words. Engineering Record, October 28. 15 cts.

Combination Stand Pipes and Elevated Water Tanks. Special structures designed and built by Chicago Bridge and Iron Works. 2 illus., 800 words. Engineering News, October 12. 15 cts.

Selecting Economical Type of Riveted Joint for Steel Pipes and Stand Pipes. Tables and diagrams developed as result of investigation to determine proper design for pipe line. Effect of efficiency of joint on economy. By Frank H. Carter. 3 illus., 2,500 words. Engineering Record, October 14. 15 cts.

**Pumping:** Motor Pumps of Rock Hill. These are operated under remote control. Were submerged by flood, but started without difficulty when waters subsided. 3 illus., 600 words. Municipal Journal, October 26. 10 cts.

The Lake View Pumping Station. This Chicago station has unusual provisions against shut-down. Many of the parts liable to accident are duplicated. By Thomas Wilson. 9 illus., 4,000 words. Power, October 10. 5 cts.

Low Lift Pumping Plant Uses Distillate Fuel. 2 pumping units have each a capacity of 59 cubic feet per second at 2-foot lift. Plant drains land near New Orleans. By B. S. Nelson. 4 illus., 1,500 words. Engineering Record, October 7. 15 cts.

Gas Driven and Steam Pumping Engines. A discussion of the relative efficiency of various types of gas-driven and steam pumping engines as applied to fire department service. By W. M. Johnson. 3,000 words. Fireman's Herald, September 23. 5 cts.

Producer Gas Engines Drive Water-works Pump. Description of a new plant at Wheaton, Ill. 1 ill., 1,200 words. Engineering News, September 28. 15 cts.

**Meterage:**

Value of Water Meters Demonstrated. From a paper before the League of Nebraska Municipalities. By H. D. Mead. 1,800 words. Water and Gas Review, August. 20 cts.

Meter Installation at Wilmington, Del. Organization of forces, plan of operation and standard installation. 3 illus., 1,500 words. Engineering and Contracting, October 11. 10 cts.

**Miscellaneous:**

Water Department Organization and Management Under Municipal Control. Suggests an organization of a water system for population of 100,000. Deals with the divisions desirable so far as administration and engineering are concerned. By H. A. Whitney. 1 ill., 4,000 words. Canadian Engineer, September 28. 15 cts.

Lining a 114-Foot Well With Precast Concrete Rings. 1 ill., 700 words. Engineering News, September 28. 15 cts.

An Emergency Gang in a Water Service. Tools and Organization essential to efficient operation of an emergency force. By Geo. H. Finneran. 3,000 words. Engineering & Contracting, October 11. 10 cts.

An Emergency Gang in a Water Service. By Geo. H. Finneran, general foreman, Boston. 2,250 words. Fire and Water Engineering, October 18. 10 cts.

The Scientific Cleaning of Settling Basins. Cost of sludge removal and effects. By Alexander Potter. 3 illus.,

3,500 words. Engineering & Contracting, October 11. 10 cts.

Methods of Tapping a 6-Foot Main Into Concrete and Steel Shaft Under Pressure. By James Skelton. 1 ill., 1,000 words. Engineering & Contracting, October 11. 10 cts.

Standard Water Rate Forms Adopted in Montana. 1 1/4 pages. Engineering News, October 5. 15 cts.

New Methods of Deriving Weir Formulas. Experimental work at University of Michigan. By Theodore Running. 4 illus., 1,600 words. Engineering News, October 12. 15 cts.

Effect of Seasonal Rainfall on Annual Run-off. Distribution of rainfall and run-off on Chemung River water shed by flood, growing and replenishing periods. By James P. Wells. 1 ill., 1,100 words. Engineering News, October 26. 15 cts.

Organization of the Baltimore Water Department. Results of reorganization to eliminate useless positions, reduce overhead expenses and consolidate details under assistant engineers and chief clerks. 1 ill., 1,000 words. Engineering News, October 26. 15 cts.

Tunnel Concreting Methods. Concreting shell of water intake at Milwaukee; hand shoveling. By L. G. Warren. 2 illus., 700 words. Engineering News, October 26. 15 cts.

## LIGHTING AND POWER.

**Street Lighting:**

A Century of Light. Traces the development from the earliest days to the present time. By Walton Clark. 10,000 words. Journal of the Franklin Institute, October. 50 cts.

Present-Day Tendencies in Street Lighting. A discussion of the various types of illuminants and some of the engineering aspects of street lighting. By P. S. Millar. 2,500 words. Electrical Review, September 2. 10 cts.

Salt Lake City's Splendid New Street Lighting. Five blocks on the Main street are provided with ornamental and efficient street lighting through formation of a special lighting improvement district with uniform special assessments. 2 illus., 1,250 words. Electrical Review, October 7. 10 cts.

**Power Plants:** Operating Results of Cleveland Municipal Lighting Plant. 700 words. Engineering News, September 28. 15 cts.

**Miscellaneous:** Guarding Against Municipal Plant Agitation. Real or supposed high rate, politics, poor service and indifference to public requirements, the principal causes of municipal ownership agitations, are discussed. By Glenn Marston. Electrical Review, October 7. 10 cts. 1,750 words.

A Way to Sell Electric Cooking Service. Service should be the keynote in selling electric ranges. Advertising and salesmanship important. By J. E. Ballard. 1,500 words. Electrical Review, October 7. 10 cts.

An Analysis of Electric Cooking. Actual energy consumption; data; tabulation of cooking rates. By H. O. Swooboda. 6 pages. Electrical Review, October 14. 10 cts. 6 pages, October 21. 10 cts.

The Design of Steel Stacks. Design is taken up in detail under 6 sub-divisions; working stresses, minimum thickness of plate, minimum size of foundation, minimum size of anchor bolts, riveting and base plates. By W. A. Hitchcock. 5 illus., 4,000 words. Canadian Engineer, September 28. 15 cts.

Design of Steel Stack. Technical and complete article. By W. A. Hitchcock. 5 illus., 4,000 words. Engineering & Contracting, October 25. 10 cts.

Use of Rectangular Sections Solves Many Problems That Would Otherwise Be Difficult in Restoring Gas Mains During Subway Construction. Boxes surrounded by concrete to reduce possible leakage. Manifolding resorted to where possible. By C. M. Green. 5 illus., 1,200 words. American Gas Light Journal, October 23. 10 cts.

Poles and Wires in Highways. Rights of abutting owners relative to placing these in front of their property. Court decisions in several states. By John Simpson. 2,250 words. Municipal Journal, October 12. 10 cts.

## FIRE.

**Protection:**

New York's Fire Protection. Sketch of the big fires of New York City and the development of its fire department.

By R. B. McIntyre, chief statistician. 1,000 words. Firemans Herald, September 23. 5 cts.

Fire Department of Buffalo. Report of National Board of Fire Underwriters. 2,000 words. Firemans Herald, October 14. 5 cts.

Standardization of Fire Protection in Canada. By J. Grove Smith. 1,750 words. Fire and Water Engineering, September 27. 10 cts.

Automatic Pumps as Fire Defence Auxiliaries. Abstract of report by committee at the I. A. F. E. 2,500 words. Firemans Herald, September 9. 5 cts.

Practical Fire Fighting. Questions asked at the New York Fire Department examination. Answers. 1 ill., 1,600 words. Firemans Herald, October 14. 5 cts.

Gloucesters Fire Protection. Part paid and part call force headed by a capable and progressive chief. Per capita loss moderate; loss per fire high. Report of National Board of Fire Underwriters. 1,250 words. Fireman's Herald, October 7. 5 cts.

**Prevention:** Report of Fire Prevention Committee. Submitted at Providence Convention of the I. A. F. E. 6,000 words. Fireman's Herald, September 9. 5 cts.

The Duties, Responsibilities and Work of the Fire Marshal's Office. By E. P. Heaton. 3,600 words. Fire and Water Engineering, October 18. 10 cts.

**Motor Apparatus:** Motorizing a Small Department. Details of the advantages to small towns and villages of installing motor equipment and explaining how the apparatus can be cared for by volunteer force. By Geo. T. Mohrbacher. 2,000 words. Fireman's Herald, October 7. 5 cts.

The Utility of the Triple Combination Pump, Hose Wagon and Chemical Engine. By Harry W. Parker, Stamford, Conn. 600 words. Fireman's Herald, September 9. 5 cts. By A. H. Fiske, Framingham, Mass. 1,000 words. Fireman's Herald, September 9. 5 cts.

**Miscellaneous:** New York Fire College Extension Course. Questions presented and answers officially promulgated for the instruction of the members of the department. Fireman's Herald, September 2, 9, 16, 23, 30, and October 7. 5 cts. each.

Significance of the Fire Waste. By F. H. Wentworth, secretary, National Fire Protection Association. 2,500 words. Fire and Water Engineering, October 18. 10 cts.

How a City Reduced Its Fire Insurance Rates. By H. E. Wood. 1,250 words. American City, October. 50 cts.

## MOTOR VEHICLES.

Economies from Motor Truck Transportation in Industrial Establishments. Costs of transportation may be reduced by proper equipment. By William Kennedy. 6,000 words. Engineering Magazine, October. 25 cts.

Economics and Costs of Motor Truck Operation. Discusses operating cost of trucks of various weight, division of cost and methods of comparing horse-drawn and motor trucks. Electric trucks. 5 illus., 4,500 words. Engineering & Contracting, October 18. 10 cts.

Use of Motor Vehicles in Municipal Work. Valuable facts and figures derived from experiences of various municipalities. By H. Shaw. 6,000 words. The Surveyor, September 22. 40 cts. 7,000 words. September 22. 40 cts. and 2,500 words. September 29. 40 cts.

Making Motor Truck Operation Pay. The second of a series of articles on the economical hauling of loose materials by motor truck. By A. P. Lee. 1,850 words. The Contractor, October 1. 20 cts.

Motor Trucks Equipped for Construction Service. How various electric service companies have provided trucks with both electrical and mechanical equipment for use in the operating, construction and maintenance departments. 15 illus., 3,000 words. Electrical World, September 30. 10 cts.

Hauling Salvage Lumber On a Large Wrecking Contract. For economical operation motor trucks should be kept moving. Often much time is required to load and unload. This article describes the method of providing the continuous movement, while allowing plenty of time for loading and unloading. Semi-trailers were used with contractors. 2 illus., 800 words. The Contractor, October 1. 20 cts.

Motor Vehicle Accidents and Traffic

Regulation. Increase of collisions; traffic conditions leading to accidents. Regulating Traffic. 3,000 words. Electric Railway Journal, October 21. 10 cts.

Rules Proposed to Control Motor Truck in Jersey. Tentative schedule of restrictions on size, weight and speed suggested as forerunner of legislation. 1,250 words. Engineering Record, October 28. 15 cts.

Hints for Trucking Contractors. Describes and illustrates many appliances and devices used on motor trucks to expedite the handling of the loads. 24 illus., 1,250 words. Engineering & Contracting, October 18. 10 cts.

#### STREET CLEANING AND REFUSE DISPOSAL.

##### Street Cleaning.

Motor Flushers Save Los Angeles \$150 Daily. A fleet of five trucks equipped with pressure pumps replaces horse-drawn machines. By John Grant. 3 illus., 1,500 words. Commercial Vehicle, October 15. 20 cts.

Business Basis Is Advocated for the New York City Department of Street Cleaning. Report of R. T. Fox and recommendations affecting the model street cleaning district. 1,750 words. Better Roads and Streets, October. 15 cts.

Municipal School for Street Cleaners. How the New York Street Cleaning Department gives instruction to its laborers and employees of higher grades. Drill in detail of performing work. Encouraging intelligence and ambition. By C. L. Edholm. 5 illus., 3,000 words. Municipal Journal, October 26. 10 cts.

##### Snow Removal.

Removal of Snow From Public Highways. Discusses the organization and financing of the work and compares results with those secured by the contract system. By John F. O'Toole, superintendent of highways and sewers, Pittsburgh, Pa. 1 ill., 2,000 words. American City, October. 50 cts.

##### Refuse Disposal.

Refuse Incinerator for Queens Borough, New York City. Description and contract test results of a 100-ton Decarie incinerator. By J. C. Woodman. 2 illus., 1,500 words. Engineering News, September 28. 15 cts.

Garbage Disposal for Two Illinois Cities. Report on proposed schemes for Danville and Galesburg. By Samuel Greeley. 1,600 words. Engineering News, October 12. 15 cts.

Eastville Refuse Destructor. General description of plant. 6 illus., 1,500 words. The Surveyor, September 15. 30 cts.

Garbage and Rubbish Disposal in Los Angeles, Cal. Instead of paying out money for garbage disposal, Los Angeles receives 51 cts. a ton for all garbage delivered to a Cobwell Reduction plant, owned privately. The company collects and reduces dead animals, charging the owners for the service and turning over to the city a large part of the fees. Combustible rubbish is collected by private contractors and sold by them to the garbage contractors, who sorts and uses it for fuel. By Seward C. Simons. 6 illus., 2,300 words. Engineering News, October 12. 15 cts.

#### CITY PLANNING.

City Replanning in Duluth. A project for improving a misfit checkerboard city plan, laid out on a steeply sloping area. By W. B. Patten. 1 ill., 700 words. Engineering News, October 5. 15 cts.

Recent City Plan Reports. By Chas. Mulford Robinson. 3,500 words. National Municipal Review, October. \$1.25.

#### GOVERNMENT AND FINANCE.

Recent Progress in Municipal Budgets and Accounts. By C. E. Rightor. 5,000 words. National Municipal Review, October. \$1.25.

A Survey of the New System of Accounting in Los Angeles County, as Prescribed by the State Board of Control. By W. D. Hamman. 1,750 words. Pacific Municipalities, October. 25 cts.

The Municipal Supply Department. The 5th and last article of a series on this subject. This considers budget and standardization problems. By Hugh M. Foster. 1,500 words. Municipal Engineering, October. 25 cts.

Standardization of Salaries in Public Service. By William C. Beyer. 1,750 words. American City, October. 50 cts.

A Method of Determining a Reasonable Service Rate for Municipally-Owned Public Utilities. By J. B. Lip-

pincott. 5,000 words. Proceeding American Society of Civil Engineers, September. \$1.

The City Manager. A new opportunity for engineers. By Gaylord C. Cummin, city manager, Jackson, Mich. 20,000 words. Journal, The Western Society of Engineers, September. 50 cts.

#### TRAFFIC AND TRANSPORTATION.

Growth of Electric Railways. A historical review of the physical development of one of the nation's greatest industries. By Frank J. Sprague. 29 illus., 36 pages. Aera, October. 25 cts.

Passenger Transportation in Large Cities. Discusses subways and tram cars or motor buses. Rush hour traffic; growth of traffic. By J. M. McElroy, general manager, Manchester Tramways. 3,000 words. The Surveyor, September 29. 40 cts.

Dependable Service Makes Maryland Bus Line a Success in Trolleyless Area. Five small buses under state direction are profitable on inter-town hauls at 3 cts. a mile. By Raymond Allen. 5 illus., 2,000 words. Commercial Vehicle, October 15. 20 cts.

#### BRIDGES AND DAMS.

What Was the Cause of the Initial Failure at the Quebec Bridge? Computations and specifications for steel rocker casting presented. Relative positions of transverse pins shown. 5 illus., 1,500 words. Engineering Record, October 7. 15 cts.

Quebec Bridge Disaster Charged to Casting. One of the four cast steel bearings supporting the 5,000-ton span believed to have collapsed while span was being lifted into place. 3 illus., 1,250 words. Iron Age, September 21. 20 cts.

Computing the Stresses in the Quebec Rocker Casting. An analysis of the structural detail that failed. 3 illus., 3,800 words. Engineering News, October 5. 15 cts.

Erecting Highway Bridges Under Traffic in Michigan. Methods adopted by State Highway Department. By C. V. Dewart, bridge engineer. 4 illus., 1,200 words. Engineering News, October 26. 15 cts.

Cost and Details of Construction of a Steel Highway Bridge. By William C. Davidson. 7 illus., 2,000 words. Engineering & Contracting, October 25. 10 cts.

Central Bridge at Lawrence Is Built From Four Separate Mixing Plants. Compressed air used for sinking caissons for piers. Constructing trestle used over shallow river. By E. K. Cortright. 5 illus., 2,000 words. Engineering Record, September 30. 15 cts.

Progress on Bloor Street Viaduct, Toronto. A general article dealing with the progress being made on what is regarded as a most important piece of reinforced concrete and steel construction. 11 illus., 2,500 words. Canadian Engineer, September 28. 15 cts.

Design of Bensalem Avenue Bridge Governed by Architectural Requirements of Site. Considers the design of Philadelphia bridge. By Jonathan Jones, assistant engineer. 2 illus., 1,750 words. Engineering Record, October 21. 15 cts.

Building Second Half of Susquehanna Bridge. Changes north half from single track iron truss to double track reinforced concrete arch bridge. 3 illus., 1,600 words. Engineering News, October 19. 15 cts.

Concrete Bridge Completed from Suspended Forms. Method adopted in completing concrete arch bridge after flood carried away false work. By F. R. Goodman. 3 illus., 800 words. Engineering News, October 26. 15 cts.

The Design of Flat Arch Corrugated Iron Culverts for Use Under Paved Streets. By J. A. Griffin. 3 illus., 3,000 words. Engineering & Contracting, October 4. 10 cts.

Theory and Tests Presented for Design of Sand Boxes to Lower Arch Centers. Importance of lowering devices discussed and various types described. Amount of settlement caused by compression of sand determined. By Frank McKiven. 3 illus., 3,000 words. Engineering Record, October 28. 15 cts.

Culverts—Their Location and Construction. An article with a number of excellent suggestions concerning the up-keep and construction of culverts of various types, such as iron, concrete, wood, beam and concrete. By Charles D. Norton. 10 illus., 4,000 words. Canadian Engineer, October 12. 15 cts.

Notes on the Preservation of Ferric Structures. Discussion of paints and other coverings for iron structures. 6,000 words. Journal of Engineers' Club of Baltimore, September. 25 cts.

Dams: Designing an Earth Dam Having a Gravel Foundation, with the Results Obtained in Tests on a Model. Paper before A. S. C. E. and discussion. 5 illus., 6,500 words. Canadian Engineer, October 5. 15 cts.

Careful Construction to Make Large Dam at Youngstown, O. Watertight, Well rolled fill, cut-off walls to rock, riprap grouting by pouring and use of local concrete materials mark construction of large storage basin. 6 illus., 2,500 words. Engineering Record, September 30. 15 cts.

The Austin Dam. History of the dam and the failures and disasters to which it has been subjected. Describes also the methods for preventing the leakage of water through the seamy limestone strata. By Frank S. Taylor. 3 illus., 4,500 words. Municipal Engineering, October. 25 cts.

#### STRUCTURAL MATERIALS.

Studies Regarding Concrete Mixtures Employed in the Construction of Shoal Lake Aqueducts. Studies and observations were very complete, the object being to obtain with a given gravel pit an aggregate which, with a minimum quantity of cement would give a concrete watertight and strong. By W. G. Chace and D. L. McLean. 4,000 words. The Canadian Engineer, October 26. 15 cts.

Factors Affecting the Strength and Proportioning of Gravel Concrete. By R. J. Borhek. 4,000 words. Engineering & Contracting, October 4. 10 cts.

Cold Weather Concrete Work. Retarding freezing by chemicals and by heating aggregate. By H. Colin Campbell. 3 illus., 2,000 words. American City, October. 50 cts.

Cold Weather and Concrete—What Precautions to Take. Bulletin of the Concrete Association. 1,500 words. Concrete, October. 20 cts.

Well Made Concrete Tanks are Affected by Few Fluids. Lard oil, sulphite liquor, cider vinegar, molasses and brine are found to disintegrate the surface. 1,000 words. Engineering Record, October 14. 15 cts.

The Use of Cement Grout Under Pressure as an Aid to Excavation. By J. F. Springer. 2 illus., 3,500 words. Concrete, October. 20 cts.

#### MISCELLANEOUS.

Municipal Docks at Astoria. Describes two piers just completed by municipality in Oregon. Describes construction details. By J. P. Newell. 5 illus., 2,400 words. Engineering News, October 12. 15 cts.

Operation of Electric Drag Line Excavators. Methods for supplying energy to excavators and cost of operation in government drainage work at Boise, Idaho. 3 illus., 1,000 words. Electrical World, October 28. 10 cts.

The Metric System. Advantages of a scientific and decimal system which is simple. Decimal system in currency. By Arthur J. Price. 3,500 words. The Surveyor, October 6. 40 cts.

Cost of Night and Day Work. Some comments on a current discussion. By A. M. Shaw. 1,400 words. Engineering News, September 28. 15 cts.

A Cost Keeping System for Building Contractors. By D. B. Duncan. 6 illus., 1,200 words. Engineering & Contracting, September 27. 10 cts.

Types of Dump Cars Used on Construction Work. Deals with various styles of cars of 1 yard to 30 yard carrying capacity. Engineering News, September 28. 15 cts. Types of Cars with capacities ranging from 18 yards to 40 yards and including unloader ploughs for dumping material from flat cars and gondolas are treated in the second article. 9 illus., 3,500 words. Engineering News, October 5. 15 cts.

The Lack of Teams Kept Down Shovel's Record. In a cut of about 5 feet depth a steam shovel excavated 615 cu. yds. one day at a cost of 3 1/4 c per cu. yd. By Stanley E. Bates. 7 illus., 1,100 words. The Contractor, October 1. 20 cts.

How a Concrete Wall was Built. To reinforce an old brick retaining wall, pushed out of place, a concrete wall was added. Careful planning of details increased the profits. By Daniel J. Hauer.

(Continued on page 589.)

## NEWS OF THE SOCIETIES

## Calendar of Meetings.

Nov. 15.—ILLINOIS MUNICIPAL LEAGUE. Annual convention, Urbana, Ill. Secretary, John A. Fairlie, University of Illinois, Urbana, Ill.

Nov. 15-16.—NATIONAL CONFERENCE ON UNIVERSITIES AND PUBLIC SERVICE. Third annual conference, Philadelphia, Pa. Secretary, Edward A. Fitzpatrick, Box 380, Madison, Wis.

Nov. 15-17.—ASSOCIATION OF URBAN UNIVERSITIES. Conference, College of City of New York. Secretary, Frederick B. Robinson, College of City of New York.

Nov. 16-18.—FIRE MARSHALS ASSOCIATION OF NORTH AMERICA. Annual convention, Nashville, Tenn.

Nov. 20-22.—MONTANA MUNICIPAL LEAGUE. Annual meeting, Lewiston, Mont. E. S. Judd, City Clerk, Billings, Mont.

Nov. 20-23.—CITY MANAGERS' ASSOCIATION. Third annual convention, Springfield, Mass. Secretary, O. E. Carr, Niagara Falls, N. Y.

Nov. 21.—MASSACHUSETTS CIVIC LEAGUE. Conference and annual meeting, Springfield, Mass. Secretary, Edward T. Hartman, 3 Joy Street, Boston, Mass.

Nov. 21-23.—UNION OF MANITOBA MUNICIPALITIES. Annual convention, Brandon, Man. Secretary, Robert Forke, Pipestone, Man.

Nov. 22-23.—MUNICIPAL RESEARCH WORKERS. First annual conference, Springfield, Mass. L. D. Upson, Program Committee, Detroit, Mich.

Nov. 22, 23.—TRAINING SCHOOL FOR PUBLIC SERVICE. Special conference, Springfield, Mass. Charles A. Beard, Supervisor, 261 Broadway, New York.

Nov. 23, 24.—CIVIC SECRETARIES' CONFERENCE. Annual conference, Springfield, Mass. Secretary, Howell Hart, Milwaukee, Wis.

Nov. 23-24.—MASSACHUSETTS FEDERATION OF PLANNING BOARDS. Annual convention, Springfield, Mass. Secretary, Arthur C. Comey, Cambridge, Mass.

Nov. 23-25.—NATIONAL MUNICIPAL LEAGUE. Annual convention, Springfield, Mass. Secretary, Clinton Rogers Woodruff, 705 North American Building, Philadelphia, Pa.

Dec. 5.—NATIONAL CIVIL SERVICE REFORM LEAGUE. Annual meeting, New Haven, Conn. Secretary, George T. Keyes, 79 Wall Street, New York City.

Dec. 5-7.—AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS. Annual meeting, St. Louis, Mo. Secretary, Joseph Hyde Pratt, Chapel Hill, N. C.

Dec. 5-8.—AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Annual meeting, New York, N. Y. Secretary, Calvin W. Rice, 29 West 39th Street, New York.

Dec. 7-9.—SAFETY FIRST FEDERATION OF AMERICA. Annual convention, Baltimore, Md. Executive Secretary, W. D. Heydecker, 6 East 39th Street, New York City.

Dec. 11-13.—PORTLAND CEMENT ASSOCIATION. Annual meeting, New York City. Assistant to General Manager, A. H. Ogle, Chicago, Ill.

Dec. 26-28.—SOCIETY OF AMERICAN BACTERIOLOGISTS. Annual meeting, New Haven, Conn. Secretary, Dr. A. Parker Hitchens, Glenolden, Pa.

Dec. 27-30.—AMERICAN ECONOMIC ASSOCIATION. Annual meeting, Columbus, Ohio. Secretary, A. A. Young, Ithaca, N. Y.

Dec. 27-30.—AMERICAN STATISTICAL ASSOCIATION. Annual meeting, Columbus, O. Secretary, Carroll W. Doten, 491 Boylston street, Boston, Mass.

Dec. 26-31.—AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE. Annual meeting, New York City. Secretary, L. O. Howard, Smithsonian Institute, Washington, D. C.

Dec. 28-31.—AMERICAN POLITICAL SCIENCE ASSOCIATION. Annual meeting, Cincinnati, O. Secretary, Chester Lloyd Jones, University of Wisconsin, Madison, Wis.

Jan. 20, 1917.—WESTERN PAVING BRICK MANUFACTURERS' ASSOCIATION. Kansas City, Mo. Secretary, G. W. Thurston, 416 Dwight Bldg., Kansas City, Mo.

Jan. 23-25, 1917.—AMERICAN WOOD PRESERVERS' ASSOCIATION. Annual meeting, New York City. Secretary, F.

J. Angier, B. & O. Mt. Royal Sta., Baltimore, Md.

Feb. 5-12, 1917.—AMERICAN ROAD BUILDERS' ASSOCIATION. Seventh American Good Roads Congress and Eighth National Good Roads Show, Mechanics' Hall, Boston, Mass. Secretary, E. L. Powers, 150 Nassau street, New York City.

Feb. 7-15, 1917.—TENTH CHICAGO CEMENT SHOW, Coliseum, Chicago, Ill. Secretary, Blaine S. Smith, 210 South La Salle Street, Chicago.

Feb. 8-10, 1917.—AMERICAN CONCRETE INSTITUTE. Hotel La Salle, Chicago, Ill. Secretary, Harold D. Hynds, 1418 Walnut Street, Philadelphia, Pa.

Feb. 19-24, 1917.—SOUTHWESTERN CONCRETE ASSOCIATION. Annual meeting and concrete show, Convention Hall, Kansas City, Mo. Chairman, Show Committee, Chas. A. Stevenson, 1433 West 10th Street, Kansas City, Mo.

## American Public Health Association.

At the 46th annual meeting of the American Public Health Association, held at Cincinnati, O., October 24-27, the following officers were elected:

President, Dr. William A. Evans, Chicago; first vice-president, Dr. John H. Landis, Cincinnati; second vice-president, Dr. M. M. Seymour, Regina, Sask.; third vice-president, Dr. Manuel Iglesias, Vera Cruz, Mex.; secretary, Prof. Selskar M. Gunn, Boston, Mass.; treasurer, Dr. Lee K. Frankel, New York. Directors: Dr. Hoyt E. Bearholt, Milwaukee; Mr. H. F. Vaughn, Detroit; Dr. Witmer R. Patt, Harrisburg, Pa.; Dr. E. R. Fitz Randolph, Trenton, N. J.; Dr. John S. Fulton, Baltimore, Md.; Dr. Henry Boswell, Bonnerville, Miss.; Dr. W. A. Sawyer, Sacramento, Cal.; Dr. John Dill Robertson, Chicago, Ill.; Dr. James A. Hayn, Charleston, S. C.; Dr. A. J. Douglass, Winnipeg, Man.; Dr. R. H. Bishop, Jr., Cleveland. Honorary members: Dr. C. V. Chapin, Providence, R. I.; Dr. Cressy L. Wilbur, Albany, N. Y.; Dr. Samuel H. Durgin, Boston, Mass.

The most important thing in public health administration is the employment of the full-time local health officer, according to Dr. John F. Anderson, president of the association. Dr. Anderson aroused considerable discussion among the public health physicians present when he declared, in the course of his address, that it is not necessary that a local health officer should be a physician. "It is, of course, desirable that he be a doctor, if he possesses the other necessary qualifications," said Dr. Anderson, but he believed many men without medical degrees could be entirely successful as local health officers.

Another of the subjects treated in his address was that of the health of wage earners. He said that "in view of the constantly increasing numbers of the population who carry on our industries, the question of their health and the risks to which it is exposed is becoming a question of continuously greater national importance."

The question whether health is purchasable came up when Dr. W. C.

Rucker, assistant surgeon-general of the United States Public Health Service, spoke.

After declaring that a public health program for cities is in reality nothing more or less than a complete plan for communal existence, Dr. Rucker said:

"Unfortunately, health has been considered in the past solely as a medical problem and the pendulum has been enthusiastically swung so far that health is almost regarded as an artificial state to be achieved and maintained solely through the interposition of medical safeguards. With entire consistence the health wardenship of cities has been committed solely to physicians, those who by training have been taught to consider the pathological in human life, the symptomatology and evidences of disease rather than the great basic, underlying, essential factors which enter into and are the vital part in the creation, spread and perpetuation of sickness. Expert knowledge of disease is absolutely necessary for the work of health departments, but cannot be the foundation of a broad municipal health policy. Public health is something more than a mere absence of disease. It is the physiological functionation of the community."

New Orleans was chosen as the place for the next annual convention of this association.

## League of Washington Municipalities.

The seventh annual convention of the League of Washington Municipalities, and its kindred body, the City Planning Conference, terminated its three-day sessions at Everett, Wash., October 14, by re-electing officers and choosing Tacoma as the 1917 convention city. Sessions of the league were attended by 55 delegates.

Resolutions endorsed at the final meeting by the league were: to add a section known as the Building-Construction, Housing and Fire Hazard; to ask the legislature to pass a law permitting cities to build stockades on municipally owned property, outside corporation limits, where prisoners may be worked; referred to the legislative committee the proposed law to divide the state into fifteen districts, with a health officer in charge of each; to ask the legislature to amend the laws to permit second class cities to levy an annual tax not exceeding 18 mills, and third-class cities not in excess of 15 mills; endorsed and recommended as a law the regulation of water supply and sewage under state board control; recommended drafting traffic laws for cities, which matter was placed in the hands of a special committee for framing.

On this committee to prepare suggestions for uniform laws to cover cities of the state with reference to motor traffic, President Meigs named William A. Johnson, of Everett; Dr. Herman Brauer and E. D. O'Brien, both of Seattle. The chair named as a committee to prepare the Building-Construction,

Housing and Fire Hazard Section: D. R. Huntington, city architect, Seattle; D. E. Hooker (chairman), building inspector, Seattle; W. Scott Snyder, superintendent of buildings, Tacoma; R. J. Davis, Everett; George Mackey, Spokane; Fred Sharkey, Wenatchee, and E. McWilliams, North Yakima.

Col. Howard A. Hanson, president of the city planning conference, who was the dominating factor in the league's discussion, will continue to head that phase of city development.

F. R. Jeffrey, of Kennewick, chairman of the committee on third and fourth class cities, completed the compilation of an optional form of government bill, the details of which were discussed at the joint committee meeting. The bill drafted by Mr. Jeffrey is modeled after the New York state law, and provides for three plans, as follows: municipal government, with limited council, and appointment of a city manager; government by a commission, and appointment of a city manager; government by a limited council, with a division of administrative duties. This optional form of government would primarily affect

cities of the third and fourth classes, and its value as an effective mode of city government has been recommended favorably.

A bill proposing the segregation of fifteen state districts where health officers would give their entire time to the service was reported by Dr. Thos. D. Tuttle, state commissioner of health. Dr. Tuttle explained that this measure would allow cities desiring the services of a health officer to obtain this work at a reasonable fee.

Nels Darling, well-known lecturer on civic affairs, discussed the enlargement of the city planning scope into a county plan, by the creation of a county planning board to assist and co-operate with town-planning boards. "It is by this method," said Mr. Darling, "that smaller outlying communities will not be neglected, and will advance industrially and artistically along with their larger neighboring cities."

Officers of the league to serve two-year terms were elected as follows: President, Leonard O. Meigs, North Yakima; vice-president, W. H. L. Ford, Everett; secretary-treasurer, Herman

A. Brauer, University of Washington, Seattle.

City engineers in attendance who had earlier proposed to form an organization of city engineers of the state of Washington, owing to the small attendance of engineers, decided to continue as a section of the league. D. W. McMorris, assistant city engineer, Seattle, acted as chairman and F. J. Sharkey, city engineer, Wenatchee, as secretary.

#### League of Texas Municipalities.

On October 26-28 the fourth annual convention of the League of Texas Municipalities was held in Hillsboro, Texas. The principal topic of discussion was public utilities. Mayor Henry D. Lindsley of Dallas spoke on "The Elements of a Public Utility Franchise;" Homer Talbot, secretary of the League of Kansas Municipalities, addressed the convention on "Municipal Ownership of Public Utilities," paying particular attention to the success of municipal ownership in Kansas cities. The last speaker on this topic was Edward T. Paxton, secretary of the Bureau of Municipal Research and Reference of the University of Texas. His subject was "State versus Local Regulation of Public Utilities."

The greatest interest developed around the topic of public health. V. M. Ehlers, State Sanitary Engineer, presented the report of the Committee on Sewerage and Sanitation. E. E. Sands, City Engineer of Houston, spoke on "Activated Sludge Disposal" and "Recent Developments in Disposal Practice." Charles Saville, Director of Public Health of Dallas, delivered an address on "How Texas Municipalities Can Solve the Problem of Sewage Disposal." These addresses were followed by informal discussion, and so much

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## PROBLEMS CITIES ARE STUDYING WITH EXPERTS

Fort Ann, N. Y., is to construct a WATER SUPPLY system, including pumping station and distribution system. Charles E. Perry, 36 State street, Albany, N. Y., has plans in progress.

Fall River, Mass., is considering a WATER CONSERVATION project. The consulting engineer, H. K. Barrow, 6 Beacon street, Fall River, Mass., has begun work on test borings.

Chilton, Wis., is to construct SEWERS from plans drawn by Jerry Donahue, York Building, Sheboygan, Wis.

East Grand Rapids and Fremont, Mich., are to construct storm SEWERS, plans having been made by J. R. Rumsey, Houseman Building, Grand Rapids, Mich.

A sanitary SEWER SYSTEM at a proposed expenditure of \$150,000 is contemplated by Miamisburg, O. The engineers are Cellarius and Dressler, 1001 Commercial Building, Dayton, O.

Betterton, Md., is contemplating the construction of SEWERS and a DISPOSAL PLANT from plans prepared by the engineers, Kastenhuber and Anderson, Dover street, Easton, Md.

In order to determine a fair purchase value for the WATERWORKS, owned by the Lake Charles Railway, Light and Waterworks Company, a consulting engineering board was appointed. The city of Lake Charles, La., appointed Clinton S. Burns, of Burns & McDonnell, Inter-State Building, Kansas City, Mo. The company appointed Nicholas S. Hill, Jr., 100 William street, New York, N. Y., and these two selected John W. Alvord of Alvord & Burdick, Hartford Building, Chicago, Ill., as a third member.

Marshall, Mich., is to make PAVING and storm SEWER improvements, plans and specifications being prepared by L. A. Bonlay Company, 1250 Nicholas Building, Toledo, O.

Youngsville and Albion Pa., are to construct SEWAGE DISPOSAL PLANTS. Plans, which are in progress, are the work of Clyde C. Hill, 24 Main street, North East, Pa.

In constructing a SEWER SYSTEM to cost \$80,000, Oakwood, Mich., has the consulting engineering services of H. L. Russell, 505 Moffatt Building, Detroit, Mich.

The city of Mount Vernon, N. Y., is actively considering the municipalizing of its WATER SYSTEM, one feature of which would be the acquisition of the essential portions of the plant of the New York-Inter-Urban Water Co., now furnishing its supply. The city has retained as special engineering advisor Louis L. Tribus, of Tribus & Massa, consulting engineers, 86 Warren street, New York, N. Y., and for making a final appraisal of the water plant has appointed Messrs. George W. Fuller, 170 Broadway, New York, N. Y., and James C. Harding, 170 Broadway, New York, N. Y., as its voting members in a conference board, to meet with Messrs. J. W. Ledoux, 112 North Broad street, Philadelphia, Pa., and Allen Hazen, of Hazen, Whipple & Fuller, 30 East 42d street, New York, N. Y., who will represent the water company. If these four cannot agree as to values, they will select a fifth engineer conferee. The final reports, however, will not be binding on either city or company, but will undoubtedly have great weight in the subsequent negotiations or proceedings.

## MUNICIPAL INDEX

(Continued from page 587.)

5 illus., 2,000 words. The Contractor, October 1. 20 cts.

Forms for Time Keeping. Second and concluding article on time keeping for contractors. 15 illus., 1,000 words. The Contractor, October 1. 20 cts.

Diagrammatic Statistics for Municipal Engineers. Urges the use of diagrams or charts to show the records and results of any particular department of engineering work. By Reginald Brown. 4 illus., 1,800 words. Canadian Engineer, October 19. 15 cts.

New York Specifications. Just adopted by the Bureau of Contract Supervision to control all purchases by city. Hypochlorite, wood paving blocks and piles. 1,000 words. Municipal Journal, October 12. 10 cts.

Clarendon Municipal Bathing Beach, Chicago. Helping the people make use of their Lake front. More than 11,000 lockers. Arrangement, construction and use of lockers and dressing rooms. Illuminating beach for night use. By F. H. Bernhard. 3 illus., 2,500 words. Municipal Journal, October 19. 10 cts.

Convention of American Society of Municipal Improvements. Descriptions of proceedings of Convention held at Newark, N. J. 3,500 words. Municipal Journal, October 19. 10 cts.

Value of Whole Time Health Officers. By Dr. Thos. B. Tuttle, State health officer, Washington. 2,000 words. Pacific Municipalities, October. 25 cts.

Three Years of Municipal Improvements in Corpus Christi. By H. M. Butler. 4 illus., 1,000 words. American City, October. 50 cts.

# NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

## SAFETY TANKS AND TUBES.

### For Handling Gasoline or Similar Liquids.

At a fire the other day in Watch Hill, R. I., the well-known summer resort, two Mystic, Conn., firemen, their clothes ablaze, had to jump into the nearby bay to extinguish the flames. They were badly burned, and for a time the loss of their eyesight was feared. They had been filling the tank of their big auto pumping engine when the gasoline exploded and their clothes caught fire. During 1913, in this country, an average of twenty persons were killed and sixty injured each week in gasoline fires.

Such accidents, which are getting more and more frequent, could in many cases be prevented by the use of safety devices in handling the gasoline. They are particularly necessary in fire houses and on fire apparatus when in service where the fire danger is very extreme. They are necessary for absolute safety wherever gasoline, benzine, naphtha or any other dangerous liquid is handled. The Kessler safety devices were invented for just this purpose. It is claimed that a portable wheel tank, as used in garages, with a Kessler safety tube instead of the filling cap, may be filled with gasoline, and the fuel evaporating at the opening of the tube ignited — the gasoline pumped out and in again through the flames with absolute safety.

The Kessler devices are adaptable to all types of tanks, motor boats, automobiles, gasoline engines and pipe line connections. Besides reducing the fire hazard, they also reduce the cost of storing and handling by preventing evaporation of fuel. The regulations of the National Board of Fire Underwriters covering the installation of containers for handling or storing of hazardous liquids require that such tanks be provided with a permanently open vent or with a combination fill and vent fitting, so arranged that the fill pipe cannot be opened without opening the vent pipe. Vent openings must be screened (30x30 brass mesh, or the equivalent) and must provide sufficient area for allowing proper flow of liquid during the filling operation.

The Kessler tube complies with these requirements, being a combination non-explosive fill and vent fitting. It is so constructed that it is open only when necessary to take air into the tank to give a free flow of gasoline, shutting off all possibility of air leaving the tank except when there may be excessive heat or when the cap is removed from the tube. The Kessler devices follow the proposed requirements of the Underwriters' Laboratories,

which found that in some other devices "the screens in a common intake and discharge orifice cannot be removed for cleaning, and in time become clogged by dirt or as the result of corrosion. In other cases the lack of an air-vent tube designed to function during the filling operation is not provided. Either condition or both of them result in spilling of the gasoline." Spilling because of these conditions is claimed to be impossible in the Kessler devices.

The Kessler equipment is of brass and the tube is made either with a spring cap or a screw cap. The accompanying illustrations show the former type of tube and a safety tank for automobiles.

The devices described are made by the Kessler Safety Device Company, 6305 South Peoria Street, Chicago, Ill.

## SEPTIC TANK.

### For Small Sewage Disposal Plants.

The Andrews septic tank is designed for the adequate disposal of household sewage in sparsely built up communities, particularly suburban developments, before the construction of municipal systems, and such necessarily isolated services as in institutions. A frequent method of installing a septic tank is to construct it of concrete or brick buried in the soil some distance from the house or institution. This necessitates running the soil pipe at a depth that will be below the frost line, and in many cases this, together with the additional loss necessitated by the connection to the tank, makes it impossible to take out the discharge pipe at the tank at a level which will allow the liquid to be discharged to the final distributing system near enough to the surface to be effective. The Andrews system is designed to eliminate this condition.

The system consists essentially of a single two-chambered tank made of  $\frac{1}{4}$ -inch steel plate, with riveted heads and manholes. It is made air-tight and

ventilation and escape of gases are effected through a pipe to the air, so that the tank may be placed in the basement of the building or at the surface outside where climatic conditions permit. A special shaped cast iron intake fitting is securely stud-bolted to the head of the tank, discharge below the scum, also a cast iron discharge siphon fitting of special design. This latter fitting is a part of the special discharge apparatus which empties the tank automatically whenever full. The tank is divided into two compartments, the waste being received through the intake fitting on one side, which when full spills over into the discharge chamber. This latter chamber empties automatically approximately every 12 or 24 hours by means of an Andrews special automatic siphon discharge pipe. The outlet and inlet are so placed that the contents are maintained in a quiescent state necessary for effective septic action and precipitation.

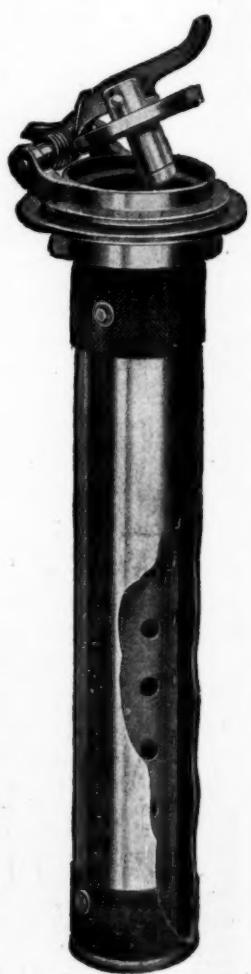
After leaving the septic tank the liquid is carried by soil pipes into a 4-inch sewer pipe from which lateral branches of 2-inch drain tiles laid with

KESSLER

SPRING-CAP

SAFETY

TUBE.



KESSLER

SAFETY

TANK.



the joints open about  $\frac{1}{8}$ -inch are taken. The branches are made from Y's so that the flow will be free and as nearly equal over the entire surface of the field as possible. The character of the soil must be of loose, light nature—and if it is not, a specially prepared filter bed must be made. The placing of the tank above ground in this system enables the tile and filter bed to be arranged quite close to the surface. This feature is important in the problem of disposal in wet soils—a special filter bed can be made of cinders, sand or some porous material.

The system in practice has been found to be odorless and not subject to freezing. The amount of sludge cleaning necessary is claimed to be only about two pails per year.

The accompanying illustration shows some plans of the system. The tank is made by the Andrews Heating Company, Minneapolis, Minn.

## INDUSTRIAL NEWS

**Cast Iron Pipe.**—Chicago—Business in the west is of minor importance, the only letting of any size being the division of 1,400 tons at Kansas City, Mo., equally to the leading interest and the American Cast Iron Pipe Company. Quotations: 4-inch, \$34.50; 6-inch and larger, \$31.50; class A, \$1 extra. Birmingham—Water pipe is not so active as it has been, owing to the slackening in outdoor work with the approach of winter, but southern points have sent in orders sufficient to keep plants going at existing productive rate for some time to come. Prices will probably advance in consonance with pig iron on new specifications. Quotations: 4-inch, \$29; 6-inch and upward, \$26; 16-ft. lengths, \$1 extra. New York—No new public lettings of any size have made their appearance. Private buying, however, is quite brisk. A feature of the current market is that practically all the large gas companies are negotiating for their next year's supplies of pipe. These purchases will foot up a heavy tonnage. The export trade is assuming much greater importance, and it is expected that considerably more business will be done with foreign countries now that such a sensational achievement has been effected

as the securing of a contract for about 66,000 net tons for shipment to Argentina by the United States Cast Iron Pipe & Foundry Company. This contract is probably but a beginning. Export inquiries are quite numerous. An advance of \$1 per ton has been made and the upward movement of pig iron seems likely to cause another early advance in the price of pipe. Quotations: 6-inch, class B and heavier, \$32.50; class A, \$33.50.

**Lead.**—Lead has been continuously dull and prices are unchanged. Quotations: New York, 7.00 cents; St. Louis, 6.90 cents.

The Buffalo Steam Roller Company, Buffalo, N. Y., and the Kelly-Springfield Roller Company, Springfield, O., announce that a merger of their businesses in a new company known as the Buffalo Springfield Roller Company was made on Nov. 6. The main factory and home offices of the new company will be located at Springfield, O. The consolidated company will constitute the largest concern in the world engaged exclusively in the manufacture and sale of road rollers. The line will comprise all types for all purposes and in sizes varying from  $2\frac{1}{2}$  to 20 tons, including the full line of Buffalo Pitts rollers in both tandem and macadam types, as well as the complete line of Kelly-Springfield steam and gasoline rollers in the same types. The entire sales organization of the Buffalo Steam Roller Company will be taken over by the new company, and its present branch offices located at Boston, New York, Philadelphia, Pittsburgh, Chicago and Portland, Ore., will be continued.

**Cast Iron Pipe Production of Canada.**—The output of cast iron pipe during the year 1915 amounted to 53,700 net tons, as compared with 93,200 tons in 1914.

**The Ingersoll-Rand Co.**, 11 Broadway, New York City, recently issued for free distribution, three new bulletins as follows: Form 9024 (32 pages) on Steam Condensing Plants—Beyer Barometric Type. This catalog describes the fundamental principles of steam condensing plants in minute de-

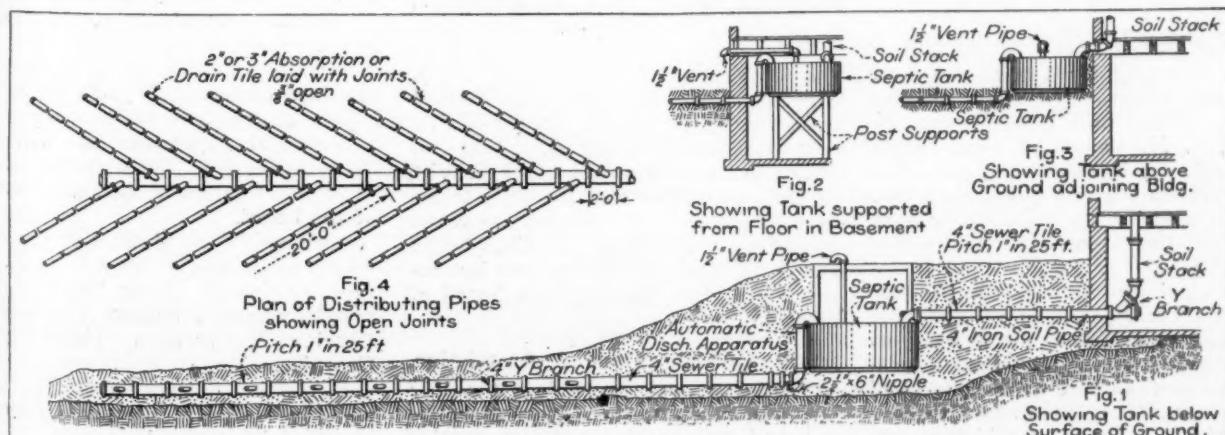
tail and makes comparisons of the Beyer barometric condenser as against low level jet condensers and surface condensers. All auxiliary apparatus, such as vacuum pumps and centrifugal water pumps are illustrated and described in detail.

Form 4122 (24 pages), describes the IR Model Leyner Drill Sharpener. It explains and illustrates the sharpener in detail and shows the various styles of bits. Machine sharpeners not only make uniform bits, but make them at less expense and with greater satisfaction than can be done by hand.

Form 3033 (28 pages), describes the Imperial "XPV" Duplex Steam Driven Compressors produced to meet the demand for a steam-driven air compressor designed and constructed to operate satisfactorily under "high pressures" and "superheat" as well as under "ordinary steam" conditions. Catalog shows the various sizes and capacities and explains in detail the operation of the "Imperial" piston valve.

**The Portland Cement Association**, 111 West Washington street, Chicago, Ill., has just published three interesting new booklets on concrete construction: "Concrete Houses and Why to Build Them," "Concreting in Cold Weather" and "That Alley of Yours."

When **The Goodyear Tire & Rubber Co.**, Akron, O., announced its offer some time ago, to refund the entire purchase price, if Goodyear S-V Tires failed to prove superior to competing makes, on a basis of cost per mile, it based its offer on the records of 5,000 test tires. The response to the challenge on the part of truck owners was magnificent and rendered it a complete success. At the termination of the offer only a few tires, of the many hundreds sold had failed, so that Goodyear S-V's emerged successfully after a campaign unique in motor truck tire history. A list of mileages from 700 of these S-V tires, selected at random, shows an average of 13,705 miles per tire to date—nearly double the written mileage guarantee of 7,000 miles. Many of them are not half worn out. S-V tires are pressed on the rim by hydraulic pressure. They are forced on the wheel base under an average pressure of seventy-five tons.



PLANS FOR ANDREWS SEPTIC TANK SEWAGE DISPOSAL SYSTEM.

This is calculated to prevent any possibility of creeping, and to eliminate all auxiliary fastenings.

#### NEWS OF THE SOCIETIES

(Continued from page 589.)

interest was aroused that the next session of the convention met an hour earlier than scheduled that the discussion might be continued.

Later the convention resolved itself into the Public Health Section meeting, and addresses were made by J. D. Harper of Dallas, Dr. W. A. King, city health officer of San Antonio, and H. W. Van Hovenberg, of the division of engineering and administration of the Department of Public Health of Dallas. Mr. Harper spoke from the layman's standpoint on "How to Get Public Support for Public Health Activities." Dr. King's subject was "Co-operation in Health Matters Between City and County in San Antonio," and Mr. Van Hovenberg, speaking on "Getting Rid of Malaria in Dallas," told very interestingly of the recent mosquito campaign in Dallas, the methods used and the results obtained.

The committee reports showed the results of extensive work and preparation.

The last session of the convention was devoted to the discussion of the place of chamber of commerce work in the activities of the municipality. J. E. Surratt, secretary of the Sherman Chamber of Commerce, read an address on "Co-operation Between City Officials and Chambers of Commerce in City Building." C. R. Gardner, secretary of the Young Men's Business League of Hillsboro, spoke on the work in that city, and Mayor Ed. H. McCuistion of Paris, retiring president of the league, ended the discussion on this topic.

Mayor J. B. Marmion of Houston Heights, president; City Attorney C. F. O'Donnell of Dallas, first vice-president; E. E. Sands, City Engineer of Houston, second vice-president; and O. J. S. Ellingsen, City Manager of Sherman, third vice-president, were the officers elected for the ensuing year.

The determination of the time and place of meeting of next year's convention was left in the hands of the executive committee.

#### New Jersey Utilities Association.

That state regulation is needed even more for municipally-owned utilities than for private utilities is the conclusion of C. M. Larson, assistant state chief engineer, department of engineering of Wisconsin, in a paper read Oct. 14 at the annual convention of the New Jersey Utilities Association, held at Atlantic City.

"Municipal utilities are able to render better service at more equitable rates and with fewer discriminations under commission control than is possible without such control," declared Mr. Larson. "It seems to be conceded that private utilities should be sub-

jected to this control, but experience shows that municipal plants violate the prescribed rules of service more often than private utilities; also that schedules submitted to the commission by municipal utilities are equally as objectionable because of discriminations in rates.

"It also appears that the uncertainty of tenure of office of municipal managers tends to reduce their efficiency.

"Objection to such control made before the 1915 legislature came from those operating the plants. Their pleas were little more than a demand that the commission be compelled to keep its hands off and thus relieve them of a large part of their duties and permit the utilities again to be used as political ammunition. No thought seems to have been given to the wishes or rights of the consumers.

"If the only function of a regulating body were that of limiting the total profits of utility, there would be little call for the state to step in. However, developments have forced an entire change until it is now quite generally conceded that the services supplied by the utilities are real public necessities. Regulation of the utility must be considered from the point of service first and rates or profits second.

"While it is true that the community through its city council has the right to determine the adequacy of its public lighting or the quality of protection against fire, the quality of the service supplied to individuals cannot well be left to the discretion of the community as a whole."

Mr. Larson called attention to the fact that while the private utilities have accepted the accounting regulations prescribed by the commission, many municipalities owning plants have entered strenuous protests against complying with these requirements. He pointed out that in 1914 approximately half of the private water plants in the state and less than 28 per cent of the municipal plants made reports that were considered good. He argued that if municipal utilities are allowed to make their own rates it would be a difficult matter for them to get the required experience and ability because the management often changes each time the council changes.

#### American Society of Civil Engineers, Texas Section.

At the annual convention held at Dallas, Texas, October 20 and 21, J. M. Howe, of Houston, was elected president; R. C. Gowdy, of Fort Worth, first vice-president, and R. J. Potts, of Waco, second vice-president. J. F. Witt, of Dallas, continues as secretary-treasurer, having been elected for two years. These officers, with C. H. Chamberlin and J. B. Hawley, retiring and last retiring president, compose the board of directors.

#### South Carolina Mayors' Association.

Charleston was selected as the 1917 convention city by the South Carolina Mayors' Association at the convention

held at Columbia, S. C., Oct. 23 and 24. The following officers were elected: W. R. Barringer, Florence, president; Z. F. Wright, of Newberry; E. R. Cox, of Darlington; L. C. Breedin, of Bennettsville, were elected vice-presidents. L. L. Rogers, of Mullins, was elected secretary and treasurer.

#### Municipal Engineers of the City of New York.

At the meeting of the society, which was held recently, G. J. F. Carey, assistant engineer of the Board of Water Supply of New York City, presented an illustrated paper on "The Moodna Supplementary Shaft and Tunnel."

#### New Jersey State Firemen's Association.

At the annual meeting of the association, held at Atlantic City, General Bird Spencer, was re-elected president, William Exall was re-elected secretary, and T. Howell Johnson treasurer. The full list of vice-presidents follows: First, Daniel D. Pote, Paulsboro; second, George J. Kinkle, Bridgeton; third, M. McGravey, Lakewood; fourth, William H. Black, High Bridge; fifth, Aug. Gerstung, Elizabeth; sixth, P. W. Walsh, Phillipsburg; seventh, A. A. Ritter, Clifton; eighth, John McAdie, Bayonne; ninth, T. M. O'Connor, Orange; tenth, Otto Hass, Montclair; eleventh, August Mulhauser, Guttenberg; twelfth, John Kraus, Jersey City.

#### County Commissioners of Georgia.

The third annual convention of the Association of County Commissioners of Georgia will be held at Macon, Ga., at 10 o'clock Thursday, November 9.

The following is the program which will be carried out:

8:30 a. m.—Registration of delegates and associate members in lobby of Hotel Lanier.

9:30 a. m.—Convention called to order in convention hall of Hotel Lanier by W. Tom Winn, president, chairman

#### Fulton County Commissioners.

Address of Welcome—W. T. Anderson, editor Macon Telegraph, Commissioner Dixie Highway; Mallory H. Taylor, vice-president, chairman Bibb County Board of Commissioners.

Response—Fred Houser, treasurer, secretary Atlanta Convention Bureau.

Reports—President, vice-president, treasurer, secretary.

Address—"The State Highway Department of Georgia," Judge T. E. Patterson, chairman of the board.

"Practical Operation of Law and How Federal Aid Will Be Obtained," Professor Charles M. Strahan, member of the board.

Address—"Cost Method of Convicts; Cost of Labor," Professor R. D. Kneale, Georgia Tech; "Map of Proposed System of Highways," Professor Charles M. Strahan, University of Georgia.

Election of officers for 1916-17. Time and place of next meeting. Adjournment to fair grounds.

# ADVANCE CONTRACT NEWS

## ADVANCE INFORMATION BIDS ASKED FOR

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

## BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
<b>STREETS AND ROADS.</b>				
Ind., Columbia City	Nov. 11.	Constituting two gravel roads.	T. A. McLaughlin, Co. Aud.	
W. Va., Logan	Nov. 11.	Constituting 2 miles of highway.	R. M. Wilson, Co. Rd. Engr.	
Ky., Whitesburg	Nov. 11.	Improving several streets.	Mayor.	
Ill., Chicago	Nov. 11.	Concrete walks on several streets.	M. J. Faherty, Pres.	
O., Tiffin	Nov. 11.	Grading county line road.	J. E. Hershberger, Co. Aud.	
O., Wilmington	Nov. 13.	Constructing several roads.	Harry Gaskill, Co. Aud.	
Minn., St. Paul	10:30 a.m., Nov. 13.	Grading a number of streets.	H. W. Austin, Pur. Agent.	
Ill., Joliet	10 a.m., Nov. 13.	Constructing cement sidewalks.	City Engineer.	
N. J., South Amboy	Nov. 13.	17,600 sq. yds. Warrenite on concrete.	A. B. Fox, County Engineer, Perth Amboy.	
Wash., Everett	Nov. 13.	Hard surfacing and grading.	Mae Weatherbee, Co. Aud.	
N. J., Glen Ridge	8 p.m., Nov. 13.	Grading several streets.	F. W. Crane, Acting Boro. Engineer.	
Md., Baltimore	noon, Nov. 14.	1.9 miles sheet asphalt pavement.	State Roads Commission.	
Texas, Fort Worth	Nov. 14.	Opening East 4th St.	F. P. G. Halbfass, Engineer.	
Ia., Muscatine	1:30 p.m., Nov. 14.	10,000 cu. yds. excavation and grading.	City Engineer.	
Fla., Milton	Nov. 14.	Constructing county road.	H. W. Thompson, Co. Clk.	
Cal., Watts	Nov. 14.	9,000 sq. yds. oil bound macadam, 5,000 ft. curb and 2,700 sq. yds. sidewalks.	V. R. Franklin, City Clerk.	
Pa., Philadelphia	Nov. 14.	Grading, paving with asphalt, vit. block, granite block, bit. macadam; surfacing waterbound mac. and bit. macadam; impt. of ave; total cost of impts., \$459,810.	Wm. H. Connell, Chairman Bureau Highways.	
N. Y., L. I. City	11 a.m., Nov. 14.	6,800 sq. yds. granite block pavement and 15,000 sq. yds. sheet asphalt; concrete sidewalks.	M. E. Connolly, Boro. Pres.	
N. Y., New York	2 p.m., Nov. 15.	7,100 sq. ft. concrete walks, sodding, etc.	Comrs Public Works, Bureau Highways.	
N. Y., New York	2 p.m., Nov. 15.	258 iron street sign frames with signs; 75 street sign frames.	Comr. Pub. Works, Bureau of Highways.	
Fla., Ormond	2 p.m., Nov. 15.	22,000 sq. yds. street pavement, curbing and grading.	C. M. Rogers, Engr., Daytona, Fla.	
Ark., Fort Smith	Nov. 15.	Paving with asphaltic concrete and concrete.	City Engineer.	
O., Pomeroy	noon, Nov. 16.	Grading and paving with brick.	W. J. Jones, Village Clerk.	
N. Y., New York	2 p.m., Nov. 16.	Improve. of portions of Manhattan Plaza of Man. bridge.	F. J. H. Cracke, Comr. Dept. Plant & Structures.	
N. J., South Orange	7:46 p.m., Nov. 16.	950 cu. yds. street excavation; 1,380 ft. of curb and 5,700 sq. ft. concrete walk.	I. T. Redfern, Village Engr.	
Cal., Santa Paula	Nov. 17.	Warrenite pavement on concrete base; cost, \$60,000.	E. M. Lynch, City Engineer, Glendale, Cal.	
Ala., Centerville	Nov. 18.	Grading and graveling; cost, \$9,500.	W. S. Keller, State Hwy. Comr., Montgomery, Ala.	
Ind., Terre Haute	11 a.m., Nov. 18.	Constituting two gravel roads.	Thos. Ferguson, Co. Aud.	
N. Y., Albany	1 p.m., Nov. 21.	Road improvement in Westchester County.	Edwin Duffey, St. Hwy. Comr.	
O., Shaker Heights	noon, Nov. 21.	Paving with brick, concrete, asphalt or bituminous macadam and constructing sidewalks and curbs.	C. A. Palmer, Village Clerk.	
N. Y., Albany	1 p.m., Nov. 21.	Bitulithic and concrete pavement in Mohawk.	Edwin Duffey, St. Hwy. Comr.	
Ind., Fort Wayne	10 a.m., Nov. 21.	Constructing concrete road.	Will Johnson, County Auditor.	
Miss., De Kalb	Nov. 22.	Grading, and sand-clay pavement on 20 miles of road.	Snowden & Hauser, Engrs. Columbus, Miss.	
Va., Roanoke	noon, Nov. 23.	Constructing granolithic sidewalks.	P. H. Tucker, City Clerk.	
O., Dayton	10 a.m., Nov. 23.	Reducing grade and improving road; cost, \$4,000.	W. H. Aszling, Clerk., Co. Commission.	
O., Euclid	noon, Nov. 27.	Curb. and pav. with brick, asph. or asphaltic coner.	F. A. Pease, Engr., Marshall Bldg., Cleveland, O.	
Kan., Kansas City	Nov. 30.	Surfacing one mile of road; cost, \$6,000.	County Clerk.	
Cal., Fillmore	Dec. 1.	Four miles cement curbs and sidewalks.	E. M. Lynch, City Engineer, Glendale, Cal.	
Fla., St. Cloud	Dec. 1.	11,000 sq. yds. hard-surface pavement with granite curb.	W. A. Ginn, Engr. in charge.	
Ala., Dothan	Dec. 4.	125-ft. steel bridge and 3 miles of turnpike.	W. R. Koonce, Co. Engineer.	
Ala., Grove Hill	Dec. 15.	Improving roads; \$30,000 available.	A. L. Smith, Co. Engineer.	
S. C., Greenville	Dec. 15.	Street paving and sidewalks; \$130,000 available.	W. F. B. Haynsworth, City Engineer.	
O., Sidney	Jan. 1.	Paving 6 miles of streets.	T. Blake, Engineer.	
N. J., Keyport	Jan. 3.	Warrenite on concrete; cost, \$65,000.	G. D. Cooper, Engr., 120 Broad St., Red Bank, N. J.	
<b>SEWERAGE.</b>				
Wis., West Allis	Nov. 11.	Sewers in several streets.	Board of Public Works.	
O., Greenville	Nov. 11.	Construction of storm sewers.	K. H. Schmermund, Clerk, Board Public Service.	
O., Napoleon	Nov. 11.	500 ft. 18-in. tile drains.	County Engineer.	
Minn., St. Paul	10:30 a.m., Nov. 13.	Sewer construction on a number of streets.	H. W. Austin, Pur. Agent.	
N. J., Elizabeth	2:30 p.m., Nov. 13.	About 300 feet 15-inch drain.	J. L. Bauer, County Engineer.	
N. J., Glen Ridge	8 p.m., Nov. 13.	Constructing 8-in. pipe sewer.	F. W. Crane, Acting Boro. Engineer.	
Ia., Waterloo	7:30 p.m., Nov. 13.	Constructing vitrified sewers.	R. L. Degon, City Clerk.	
Utah, Salt Lake City	10 a.m., Nov. 14.	Constructing outlet sewer and ditch.	S. O. Cannon, City Engineer.	
Texas, Quanah	10 a.m., Nov. 15.	Constructing sewer system and disposal plant.	H. E. Elrod, Engr. Interurban Bldg., Dallas, Texas.	
O., Bellefontaine	Nov. 15.	Sewer construction; cost, \$65,000.	C. A. Inskeep, City Engr.	
N. Y., Brooklyn	11 a.m., Nov. 15.	Constructing sewers; estimated cost, \$2,400.	L. H. Pounds, Boro. Pres.	
Ia., Garner	1 p.m., Nov. 15.	5,500 ft. 12 to 18-in. tile drains and 60,000 cu. yds. excav.	E. T. Hanson, County Aud.	
Minn., Benson	1 p.m., Nov. 15.	Constructing tile drainage ditch; cost, \$5,600.	D. P. Carney, Co. Aud.	
Minn., Benson	10 a.m., Nov. 15.	Tile drainage ditch; cost, \$66,700.	D. P. Carney, Co. Aud.	
Minn., Benson	3 p.m., Nov. 15.	Tile drainage ditch; cost, \$20,000.	D. P. Carney, Co. Aud.	

## CONTRACTS AWARDED ITEMIZED PRICES

## BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
N. Y., New York	2 p.m., Nov. 15.	Sewer in East 76th St.; receiving basin	Comr. P. W., Bureau Sewers.	
J. So. Orange	7:45 p.m., Nov. 16.	15-in. tile drain	I. T. Redfern, Village Engr.	
N. J., Elizabeth	Nov. 16.	150 ft. 8-in. and 180 ft. 6-in. vit. terra cotta sewer with branches, etc.	Board of Public Works.	
Utah, Richfield	8 p.m., Nov. 16.	4,500 ft. 6 to 10-in. drains	Edna Kruetz, City Recorder.	
Wis., Milwaukee	Nov. 16.	Extending intercepting sewer system	Sewerage Commission.	
Ind., Kokomo	Nov. 16.	Extending sewers in two streets	Ben Havens, City Clerk.	
Wash., Fort Flagler	2 p.m., Nov. 17.	Constructing sewer outlet	Quartermaster, Ft. Worden.	
Ia., Des Moines	2 p.m., Nov. 20.	Constructing drainage ditch; cost, \$21,500	F. J. Alber, Co. Aud.	
N. J., Camden	Nov. 20.	Sewers in Magnolia Ave.	L. E. Farnham, City Engr.	
Md., Hagerstown	7:30 p.m., Nov. 20.	4,600 ft. 54-in. sewer, 1,100 ft. in tunnel	Sewerage Commission.	
N. J., Plainfield	Nov. 20.	3,860 ft. 12 to 45-in. sewer	J. J. Carroll, City Clerk.	
Cal., San Diego	Nov. 20.	Sewer sys., requir. 28,600 ft. sewer pipe; cost, \$32,000	Geo. Cromwell, City Engr.	
D. C., Washington	Nov. 21.	7,000 ft. 33 to 72-in. sewer; reflooring 900 ft. of sewer	Dist. Comrs., District Bldg.	
O., Shaker Heights	noon, Nov. 21.	Constructing storm and sanitary sewer	C. A. Palmer, Village Clerk.	
D. C., Washington	Nov. 28.	8,200 ft. 54-in. sewer	Dist. Comrs., District Bldg.	
Fla., St. Cloud	Nov. 30.	Constr. sewer system and disp. plant; cost, \$21,500	W. A. Ginn, Sanford, Fla.	
La., New Orleans	noon, Dec. 21.	Constr. 3 12-ft. steel discharge pipes for drain. pumps	G. G. Earl, Gen. Supt. Sewerage & Water Board.	

## WATER SUPPLY.

Wis., West Allis	Nov. 11.	Extending water mains	E. G. Orbert, City Engr.
Fla., Jacksonville	4 p.m., Nov. 14.	Relining and waterproofing aerating basin of water works, using reinforced concrete and cotton fabric with bitumen waterproofing	Water Dept., Engineer Bldg.
Okl., Frederick	Nov. 14.	Constructing water system	J. L. Morrow, Supt.
Miss., Coffeyville	Nov. 14.	Constructing water system	City Clerk.
O., Lima	Nov. 15.	Improving water system; cost, \$500,000	Dir. of Public Service.
Ill., Aurora	10 a.m., Nov. 15.	Constructing reinforced concrete covered reservoir with appurtenances	D. H. Maury, Engr., Monadnock Bldg., Chicago, Ill.
D. C., Washington	Nov. 20.	Drilling artesian well at Point Isabel, Texas	Bureau of Yards & Docks, Navy Dept.
O., Shaker Heights	noon, Nov. 21.	Constructing 6 and 8-in. water mains	C. A. Palmer, Village Clerk.
N. Y., Syracuse	2 p.m., Nov. 21.	Altering and improving water supply at Colony for Epileptics, at Soneya, N. Y.	L. F. Pilcher, State Architect, Albany, N. Y.
O., Columbus	noon, Nov. 24.	Driving wells at garbage reduction plant	G. A. Borden, Pres. Bd. Pur.
Ill., Wilmington	Nov. 27.	750-ft. well and waterworks system; cost, \$34,000	J. H. Thompson, Mayor.
La., New Orleans	noon, Nov. 29.	Water and sewer construction	G. G. Earl, Gen. Supt., Water & Sewerage Board.
Fla., St. Cloud	Dec. 1.	Constructing water works system and power plant	W. A. Ginn, Engr. in charge

## MISCELLANEOUS.

N. J., West Orange	Nov. 13.	Collecting garbage and rubbish	City Clerk.
Ont., Ottawa	noon, Nov. 15.	Reinforced concrete grain elevator	John S. Metcalf, Engr., Montreal, Quebec.
Fla., Jacksonville	noon, Nov. 15.	1,750,000 cubic yards open ditch and concrete spillways	Isham Randolph & Co., Engrs., Heard Bank Bldg., Jacksonville.
Miss., Sledge	9 a.m., Nov. 15.	2,400,000 cu. yds. ditch and levee excavation	Morgan Engrg. Co., Memphis, Tenn.
Ind., Winchester	10:30 a.m., Nov. 18.	Constructing drainage ditch	A. B. Purdy, Comr. in Charge.
Minn., Duluth	1:30 p.m., Nov. 20.	125,000 cu. yds. ditch excavation; cost, \$22,700	O. Halden, Co. Aud.
N. J., Trenton	noon, Nov. 20.	Dredging river; \$50,000 available	State Bd. of Com. & Navig'tn.
Tex., Eagle Lake	1:30 p.m., Nov. 22.	75,000 cubic yards ditch excavation	E. A. Frazee, Secy., Drainage District.
O., Akron	Nov. 23.	Fill at Kenmore Canal bridge	U. G. High, Clerk, Bd. of Co. Comrs.
Texas, El Paso	2 p.m., Nov. 24.	214,000 cu. yds. canal and levee excavation	U. S. Reclamation Service.
D. C., Washington	Nov. 27.	Reinforced concr. seawall at Nav. Acad. at An'P'ts, Md.	Bureau of Yards & Docks, Navy Nept.
Mont., St. Ignatius	2 p.m., Nov. 28.	195,000 cu. yds. canal excavation	U. S. Reclamation Service.
Pa., Wilkes-Barre	noon, Dec. 1.	Collecting and disposing of garbage and rubbish for 5, 7 or 10 years	Fred Gates, City Clerk.

## STREETS AND ROADS

**Fresno, Cal.**—The necessity of a better road between Fresno and Coalinga was the subject of an informal conference of representatives of civic organizations at the Commercial Club. A committee consisting of William Stranahan, president of the Commercial Club, and H. E. Patterson, secretary of the Merchants' Association, will make a request to the Board of Supervisors that something be done.

**Los Angeles, Cal.**—Ordinance adopted ordering the opening of 8th St. between Wilson St. and the westerly line of the official bed of the Los Angeles River.

**Sacramento, Cal.**—Resolution ordering the following street work on J St., from Ashley Ave. to Apricot Ave., by improving with concrete curbs, gutter, drains, sewers, manholes and pavement.

**Perry, Fla.**—The board of commissioners of Taylor county probably will advertise in November for bids for construction of roads, for which \$600,000 of bonds were voted. No decision has been reached as to what material or materials will be used for the different sections of roads stated that brick with grout filler and with sand filler, asphaltic concrete, asphalt macadam and modified asphalt will be considered and bids upon them asked. Address Clerk of Board.

**Louisville, Ga.**—Jefferson county voted \$53,000 road bonds. Address County Clerk, Louisville.

**Statenville, Ga.**—Echols county plans road from Statenville to county line. Address County Clerk, Statenville.

**Catlin, Ill.**—Road improvement bonds to the amount of \$22,000 have been sold.

**Joliet, Ill.**—Bids for the construction of 33 feet of 12-ft. concrete sidewalk on the west side of Chicago St., north of Webster St., were authorized by the Bd. of Local Improvements. There are 99 ft. of sidewalk territory at this point needing sidewalk.

**Mattoon, Ill.**—The Highway Comrs. of Mattoon Twp., are making arrangements now for the letting of contract next January for the construction of 2 miles of permanent highway.

**Moline, Ill.**—The council is planning to lay 15 miles of cement walks. Address Commissioner Erickson.

**Crown Point, Ind.**—Three issues Lake county highway bonds in amounts of \$15,000, \$14,000 and \$12,000 were sold to the People's State Bank of Crown Point, Ind., for a total premium of \$1,300.

**Goshen, Ind.**—A \$12,000 issue Elkhart County highway bonds was awarded to Miller & Co., of Indianapolis, for \$431. They are 4% per cent, 20-year bonds. Other bidders as follows: Miller & Co., Indianapolis, \$431; Fletcher American Natl. Bank, Indianapolis, \$422; J. F. Wild & Co., Indianapolis, \$362.75; Breed, Elliott & Harrison, Indianapolis, \$360; Mitchel Charnley, Goshen, \$301.50; Chas. O. Bechtel, Wakarusa, \$301.10; R. L. Dollings & Co., Indianapolis, \$295; St. Joseph Valley Bank, Elkhart, \$271.50; Robbins & Co., New York City, \$135.60.

**Hartford City, Ind.**—Petition for a road built under the three-mile road law, from Mill St. to Wabash Ave., along Conger St., one block north of North St.

**Jeffersonville, Ind.**—Clark Co. high-

way bonds to the amount of \$13,000 were sold to Miller & Co. of Indianapolis for \$381. Bonds bear 4 1/2 per cent and cover a period of 10 years. Other bids as follows: Breed, Elliott & Harrison, \$377; Fletcher American Natl. Bank, \$366.25; Union Trust Co., \$345.30; Meyer-Kiser Bank, \$316.30; R. L. Dollings Co., \$280; also the First National Bank of Jeffersonville, \$286.

**La Porte, Ind.**—An issue of \$23,200 of La Porte County road bonds was awarded to the Fletcher-American National Bank, Indianapolis, by the county treasurer, for \$24,061.25.

**Monticello, Ind.**—County Treasurer O. C. Middlestadt sold 7,000 White County road bonds to the State Bank of Monticello for \$211.50.

**New Albany, Ind.**—Bids received Nov. 9, 1916, at 10 a.m., by treasurer of Floyd County, for sale \$12,160 highway improvement bonds, 4 per cent. Claude A. Sittson, treasurer.

**Peterburg, Ind.**—Pike county highway bonds to the amount of \$28,000 were purchased by J. F. Wild & Co., of Indianapolis, for a premium of \$1,137.50.

**Valparaiso, Ind.**—Breed, Elliott & Harrison, Cincinnati, have purchased \$18,200 worth of county bonds covering what are known as the Lytle gravel road improvements, \$511.55.

**Sioux City, Ia.**—The council ordered the Milwaukee and Illinois Central railroads and the Service Company to repair the West Third and Sioux St., Adams and Floyd Ave. crossings.

**Concordia, Kan.**—A resolution to pave the alley in block No. 146 was passed

and the city engineer directed to give grade for the paving.

**Louisville, Ky.**—The construction of concrete sidewalks on Walnut St., between 6th and 7th Sts., was recommended by Commissioner McCorkle.

**Crowley, La.**—An election will be held in the near future to vote on the question of issuing road bonds to the amount of \$60,000.

**Boston, Mass.**—At city council Councilor Storrow presented an order calling on the street commissioners to take up street widenings, to be accomplished during a series of years, as money may become available; expenditure of \$5,000,000.

**Haverhill, Mass.**—An order was passed for bituminous paving on Locust St. 2 in. thick for a distance of 870 yds., at a cost of \$1.65 per sq. yd.

**Hastings, Mich.**—In the spring there will be placed before the voters a project to pave East State St. from the end of the pavement in the business district to Manee's corners at the east city limits, the distance being one mile.

**Sault Ste. Marie, Mich.**—Board of public works authorized and instructed to grade and ditch Fifth Ave. from 12th St. to the hill, also 18th and 19th Sts.

**Duluth, Minn.**—Highway is now assured; \$10,000 nearly raised in the city, and Minneapolis and St. Paul have pledged their share. State Highway Association will make plans for the improvement in Pine county.

**Minneapolis, Minn.**—The Minnesota Scenic Highway Association, with headquarters at Brainerd, was incorporated to aid in the construction, operation and maintenance of a trunk line highway which will extend from St. Paul to Elk River, then loop through the northern part of the state, running back to Elk River from the west.

**Waynesboro, Miss.**—Board of Supervisors intend to issue roads bonds to amount of \$25,000.

**Chillicothe, Mo.**—The paving on West Calhoun St. will be continued from Sunset Ave. to Grandview Ave., 1,255 ft.

**Atlantic City, N. J.**—Commissioner C. D. White will ask commission to authorize paving of several streets next year, at cost of \$60,000.

**Elizabeth, N. J.**—Street Commissioner Neasey was directed to notify owners of property to lay new sidewalks in sections of Stewart place, Rosehill place, Berwick St., Bayway, Dayton St., Linden Ave., Canton St. and Jersey Ave.

**Elizabeth, N. J.**—Resolutions adopted, calling for the repair of sidewalks, curbs and gutters in following streets: South and Grove Sts., from South Broad St. to Grier Ave.; Berwick St., from Linden Ave. to Jersey Ave.; Bayway, from Jersey Ave. to Murray St.; Dayton St., from Linden Ave. to Murray St.; Linden Ave., from Clermont terrace, west, 1,000 ft.; Jersey Ave., from Berwick St. to Bayway, and Canton St., from Bayway, west, 1,000 feet.

**Elizabeth, N. J.**—On recommendation of the committee on streets, the Public Service Co. was granted permission to install conduits, manholes, etc., in First St. from Elizabeth to Port Aves.

**Elizabeth, N. J.**—Ordinance, providing for the flagging of Alton St., from Jersey Ave. to Canton St., was passed on first and second readings.

**Elizabeth, N. J.**—See "Sewerage."

**Syracuse, N. Y.**—Plans were approved for resurfacing Midland Ave., from West Kennedy St. to West Colvin St.

**Utica, N. Y.**—Ordinances adopted providing for a new sidewalk in Breese St. and repairs to a walk in Dudley Ave.

**Beaufort, N. C.**—See "Water Supply."

**Bellefontaine, O.**—Bellefontaine St. improvement bonds, advertised for sale, were withdrawn, the work being postponed until spring.

**Cleveland, O.**—See "Water Supply."

**Cohocton, O.**—An issue of city bonds aggregating \$10,000 were sold to A. E. Aub & Co., Cincinnati, at \$137.50 premium. The bonds are of \$500 denominations, bear 4½ per cent interest and mature two in March 1st of each year beginning 1918.

**Dayton, O.**—Sidney Spitzer & Co., Toledo, bought \$224,800 worth of paving bonds at a premium of \$10,981.28. All these bonds bear interest at 4½ per cent, excepting \$25,000 of the sinking fund bonds, which bear 4 per cent.

**Deer Park, O.**—Village clerk will receive proposals until 12 o'clock, noon, Nov. 29, for purchase of ten coupon

bonds, sum of \$1,704.40, for improving Amity Ave.

**Deer Park, O.**—Ordinance to proceed with the improvement of Collegeview Pl., from N. Bend Rd. to northern terminus, by grading, setting concrete curbs, paving the roadway with concrete, constructing the necessary drains and inlets and laying a 6-in. water main.

**Deer Park, O.**—Ordinance to issue \$68,500 bonds for improving W. 6th, St. Clair Sts., Jefferson and Glendora Aves., and Diamond Alley.

**Deer Park, O.**—An ordinance for the issue of \$3,000 bonds to pay cost of opening and extending Wickham Alley.

**Deer Park, O.**—Ordinance to proceed with the improvement of Rice St., from Gage St. to Winkler St., by setting granite curb, paving the roadway with granite and constructing the necessary drains and inlets.

**Greenville, O.**—City Engineer Robert Horn, City Bldg., will prepare plans for about 2,000 ft. concrete curb, gutter and paving in Vine St., and about 2½ miles brick paving in Union and West Sts. Robert Horn, City Engineer.

**Kenton, O.**—Village street improvement bonds to the amount of \$21,890 were sold to-day by the village of Alger to Duefee, Niles & Co., of Toledo.

**Middletown, O.**—Franklin township, Warren county, immediately adjacent to Lemon township in Butler county, will vote on an \$8,000 bond issue for the improvement of its roads.

**Oberlin, O.**—Council has voted in favor of the improvement of North Main St. by paving to a width of 25 ft.

**Plymouth, O.**—An issue of \$17,675 5 per cent street bonds were sold to Field, Richards & Co., of Cincinnati, for a premium of \$447.

**Upper Sandusky, O.**—The Huston road bonds and Miller road bonds have been awarded to the Tillotson & Wolcott Co., Cleveland, at \$330.63.

**Urbana, O.**—City Auditor Grow has announced his refusal to award \$33,500 of street paving bonds to Bolger, Mosser & Williams, Chicago, at their bid of \$1,116.30 premium, because of conditions attached, which he says are objectionable. He has awarded bonds to A. E. Aub & Co., Cincinnati, whose unconditional bid of \$1,055, was next highest. Bonds pay 5 per cent.

**Lawton, Okla.**—The attorney general has approved an issue of road bonds to the amount of \$250,000.

**Wister, Okla.**—Red Oak Twp. election resulted in favor of issuing road bonds to the amount of \$32,500.

**Woodward, Okla.**—County Commissioners have petitioned to call election to vote on road improvement bonds, \$55,000.

**Eugene, Ore.**—H. W. Libby, county engineer, requested to ask for bids to build N. 1st Rd., one from Station 40 and 100 to Station 135, a distance of 3,500 ft.

**Erie, Pa.**—Ordinances for paving Reed St. from Sixth to Eighth Sts., and construction of a sanitary sewer in 27th St. from Raspberry St. east 500 ft. were offered in council by Street Director Kinney.

**Harrisburg, Pa.**—Ordinances passed: Paving Orange alley, Woodbine to Emerald; paving Oak St., Seventh to Elizabeth; placing Bailey, 12th to 13th, on city map; grading Susquehanna (Lilac) St., Emerald to Seneca.

**Winnipeg, S. C.**—Building of better city streets and the betterment of sanitary conditions were discussed.

**Newport, Tenn.**—Bids are invited for approximately 9,908 sq. yds. of paving, 1,334 lin. ft. concrete curb, 1,746 lin. ft. concrete curb and gutter, 608 ft. of gutter, 2,225 cu. yds. of excavation. Bids are invited for following kinds of paving: Cement concrete, sheet asphalt, asphaltic concrete, bituminous. Address G. F. Smith, Mayor.

**Austin, Tex.**—The attorney general approved an issue of \$100,000 Upshur county road improvement district bonds.

**Dallas, Tex.**—City commission grants paving petitions: Peach, Bryant to San Jacinto Sts., asphaltic concrete; Olin, Bryan to Elm Sts., bituminous; Grand, Holmes to Gould; McKinney, Walter to Knox Sts., natural lake asphaltic concrete.

**Lefors, Tex.**—Gray County will vote \$40,000 road bonds in the near future.

**Rusk, Tex.**—Bond issue for good roads carried: \$250,000, Dist. No. 1, Oct. 21. Fannin (Bonham, Tex.), \$150,000, Dist. No. 19, Oct. 21.

**Portsmouth, Va.**—Issue of bonds to the amount of \$80,000 for street improve-

ment in the Seventh Ward was approved by the department of public service and sent on to the financiers.

**Richmond, Va.**—Widening 15th St. from Main to Dock to a uniform width of 40 ft. is a project mapped out by Commissioner Graham B. Hobson, submitted to the administrative board.

**Richmond, Va.**—City Engineer Bolling was instructed by the board to advertise for bids for graveling a 16-ft. roadbed on 44th St. from Reedy Ave. south to Reedy Creek.

**Lewisburg, W. Va.**—\$103,000 will be expended to improve 15 miles of road in Fort Spring district. Address John S. Crawford, County Clerk.

**Eau Claire, Wis.**—Road and bridge committee are considering bonding the county for system of permanent highways. S. P. Hall, division engineer of the State Highway Commission, and Mr. Dolan of the Portland Cement Co. agreed that approximately 90 miles of concrete road could be built for \$750,000.

**New London, Wis.**—Petition to pave North Water St., the board was given power to employ a competent engineer for the ensuing year. His duty will be to make a survey and estimate of cost for the new paving.

**Brant County, Ont.**—The County Council decided to inaugurate a county roads system to consist of about one hundred miles. County engineer, A. M. Jackson, Brantford.

**London, Ont.**—City council intends to construct a 42½-ft. asphalt concrete pavement and 6-in. curb on Adelaide St., from Dufferin Ave. to Oxford St., at an estimated cost of \$29,975.86. S. Baker, City Clerk.

**Toronto, Ont.**—R. C. Harris, commissioner of works, has recommended the construction of a concrete walk on the south side of Oakcrest Ave. Estimated cost, \$1,055.

**Toronto, Ont.**—City may construct a macadam roadway at an approximate cost of \$5,500 on Merton St.

#### BIDS RECEIVED AND CONTRACTS AWARDED.

(\* Indicates Contracts Awarded.)

**Grove Hill, Ala.**—\*Crawley Bros., Bay Minette, secured contract let by Clarke county for improving portions of Jackson and West Bend roads, for \$13,340.

**Pine Bluff, Ark.**—Contract for constructing 17,000 sq. yds. of bituminous macadam pavement was awarded to \*J. A. Perdue & Co., at about \$15,000.

**Hermon Beach, Cal.**—Contract for paving with topeka on concrete base and constructing concrete curbs and sidewalks on portions of Third St., Cochise Ave. and Railroad Drive was awarded to \*Municipal Improvement Co., Richmond, at \$8,012.61.

**Sacramento, Cal.**—\*Clark & Henery Construction Co., contract for constructing concrete curb, gutter, 10 lin. ft. of 6-in. vitrified ironstone sewer pipe drain, 7 lin. ft. 8-in. vitrified ironstone sewer pipe drain; one cast iron gutter drain with 6-in. vitrified ironstone sewer pipe elbow attached; 1 concrete manhole, complete with cast iron curb and cover, grading concrete sidewalk, asphaltic concrete. Pavement consisting of a hydraulic concrete foundation 4 in. thick, asphaltic cement flush curb, asphaltic concrete wearing surface 1½-in. thick on Cornell Ave. to the easterly line of Florence Ave.

**Sacramento, Cal.**—\*Joe Lawrence, contract for improving 20th St. from the southerly line of C St. to the northerly line of R St., by constructing concrete sidewalk and grading.

**San Luis Obispo, Cal.**—\*E. D. Cole Construction Co., city, let contract cement sidewalk on Morro St., about 21½ cts. per sq. ft.

**San Francisco, Cal.**—\*O. McHugh, 304 Russ Bldg., about \$5,400, secured contract let by city for improving one block, Balboa St.

**San Rafael, Cal.**—City let contract for macadamizing West End St. to \*Baker & Martin, Sheldon Bldg., San Francisco.

**Tampa, Fla.**—Bids received Oct. 24 in Hillsborough Co. paving with sand asphalt \$2,250 sq. yds. crushed stone foundation, 4 ins. thick, completed. Contract let to \*Davis & Webb, Tampa, Fla., \$2,850, lump sum bid for pavement base and 2,700 lin. ft. concrete curb. B. M. Sullivan, Engr.

**Atlanta, Ga.**—Contract for the paving of Virginia St. from Boulevard to Highland Ave. and of East 10th St., from

Piedmont to Boulevard was awarded by the county commissioners to \*T. D. Meador, Jr., of Atlanta. Calls for the paving of the two streets with asphaltic concrete at a total cost of \$47,000. This improvement will connect a continuous smooth driveway from Ansley Park to the Druid Hills section.

**Kankakee, Ill.**—To \*F. Shidler, 428 South Rosewood Ave., city, let contract for paving West Ave. and Chestnut St.

**Indianapolis, Ind.**—Board of public works let the following contracts: Woodland Ave., from Fall Creek to Maple road, asphalt, to \*Union Asphalt Construction Co.; Greer St., from McCarty to Buchanan, asphalt, \*Marion County Construction Co.; Kenwood Ave., from 28th to 30th, asphalt, \*Union Asphalt Construction Co.; Downey St., from East to Leonard, asphalt, \*Marion County Construction Co.

**Des Moines, Ia.**—City let contract paving Second and Vine Sts. to \*Wagner Paving Co.; resurfacing and paving Third St., \*J. A. Horrabin, 1422 Walnut St.

**Baltimore, Md.**—City let contract paving Baltimore and Worth Ave., Contract No. 141, to \*Baltimore Asphalt Block & Tile Co., Monroe and Lohman Sts.; about \$150,000.

**Kansas City, Mo.**—Board public works let contract 1,881 sq. yds. concrete paving on Agnes St. and 5,560 sq. yds. bituminous paving Wornall Rd. to \*C. T. Brosnahan.

**Springfield, Mo.**—\*J. J. Underwood contract paving portion Harrison St., \$1.28 per sq. ft. Lyons St., \*Sherwood Meyers.

**Lincoln, Neb.**—City let contracts paving to \*Roberts Construction Co., Dist. No. 367, \$11,595; \*Burke & Cochrane Construction Co., First National Bank Bldg., Dist. No. 368, \$36,140; Dist. No. 369, \$11,784.

**Glen Ridge, N. J.**—\*Osborne & Marcello, 272 Bellevue Ave., Upper Montclair, at \$64,890, secured contract for laying concrete pavement on Ridgewood Ave.

**New York, N. Y. (Bronx).**—For improving portion W. 238th St., \*Spadaro Contracting Co., 827 East 217th St., secured contract.

**Monroe, N. C.**—City let contract sidewalks, guttering, curbing and paving to \*Gulf Paving Co., Chattanooga.

**Bellaire, O.**—Contract awarded \*Clifford & Schannafeet, Bellaire, for paving West Washington St.

**Cheviot, O.**—City let contract paving portion Carson and Cheviot Ave to \*Wellings & Franz, Ninth and Plum Sts., Cincinnati.

**Columbus, O.**—State Highway Commissioner Cowen received bids for the construction of 21 miles of road at an estimated cost of \$198,830. Low bidders: Section E, Wilmington-Xenia, The Champion Bridge Co., Wilmington, O., \$4,998; Section A, Wilmington-Hillsboro, Bean & Co., Highland, O., \$20,949; Section E, Logan-Lancaster, Olive G. Shafer, Caldwell, O., \$5,539; Section F, Columbus-Lancaster, Theo. Vogelsburg, London, O., bituminous macadam, \$13,668; J. A. Jones, Columbus, O., and J. C. Gannon, Ironton, O., solid natural lake asphalt, \$14,194.98; Section F, Ottawa-Findley, J. W. McDowell, Ottawa, O., \$10,002.17; Section M, Findlay-Tiffin, The National Lime & Stone Co., Carey, O., \$14,100.

**Columbus, O.**—City let contract improving Lakeview Ave. to \*Cleveland Trinidad Paving Co., 420 Lakeside Ave., Cleveland, \$20,790.

**Dayton, O.**—The contract for the macadamizing of the Springfield pike has been awarded to \*Contractors Geiger & Finke, at their bid of \$72,000. Plans by County Engineer V. C. Smith.

**Dayton, O.**—The city has awarded to \*Graham, Kanier & Co., of Columbus, contract for paving Chapel St.

**East Palestine, O.**—The contract for paving Pigeon Run road one-half mile south of Tremont St. has been awarded to \*T. H. Diefenbacher & Sons.

**Portsmouth, O.**—The board of control has awarded to \*Kelly Bros. the contract for paving Central Ave., Grant St. and Spring St., Kendall Ave. and Center St. Pebbles wire cut paving block is specified. \*S. Monroe & Son, for other streets, to be paved with Portsmouth block.

**Toledo, O.**—The board of public service awarded to \*Harris & Tansy the contract for paving Elm St. with brick at their bid of \$199,000. \*Peters Bros. Co. have contract for paving three alleys.

**Toledo, O.**—Contracts for paving two Point Place roads were let by the county

commissioners to \*Edward Oberle. Peach Ave. was \$7,197.70; Bay Ave., \$3,999.

**Kingston, Pa.**—\*Davis & Parry, Dunceton, Pa., secured contract for vitrified brick paving, grading and curbing in Curtis St., Payne Ave. and Elm Ave., Kingston. W. J. Williams, boro secretary, Kingston. Young & Wintermute, engineers, Second National Bank Bldg., Wilkes-Barre, Pa.

**Pittsburgh, Pa.**—City let contract paving portion Westfield St. to \*F. & F. Dulus, 40 Boundary St., about \$28,000.

**South Fork, Pa.**—City let contract for paving portion Maple St. to \*Farquato Bros., Winber, about \$5,700.

**Uniontown, Pa.**—\*Bell, Bockel Co., Central Trust Bldg., Altoona, Fayette County, let contract road work in Bullskin Twp.; about \$25,000.

**Houston, Tex.**—\*Finley Method Co. awarded contract for paving with tarvia of the Katy and Washington Co. roads, the two improvements to cost \$18,152 and \$16,620; for patching on the Griggs Rd. to \*W. A. Scott at a cost of \$30. The Finley Method Co. also notified to place the second tarvia treatment on that portion of the Washington County Rd. which was previously paved, stretching from Thompson St. Brunner to Eureka.

**Texarkana, Arkansas, Tex.**—Paving matters occupied the attention of the Board of Improvement of District 20, the secretary and engineer. Forty representatives on the street paving, and manufacturers of materials, were present at the opening of the bids. The following is a list: Southern Paving Co., Houston, Tex., \$224,238.87; Natl. Paving Co., Kansas City, Mo., \$201,489.51; Kaw Paving Co., Kansas City, Mo., \$197,529.32; Burke Bros., 701½ Garrison Ave., Ft. Smith, Ark., \$190,055.86; Standard Paving Co., San Antonio, Tex., \$214,029.53; Cleveland-Trinidad Paving Co., Cleveland, O., \$231,510.99; Memphis Paving Co., Memphis, Tenn., \$257,229.21. Burke Bros. of Ft. Smith have apparently placed the lowest bid. There was no award made, owing to the absence of Comr. Milton Winham.

**Richmond, Va.**—Contracts awarded by the administrative board as follows: \*J. C. Cheatwood, paving sidewalk on the west side of Laurel St., between China and Holly, \$420; \*William Kelly, Jr., sidewalk on east side of Jefferson St., between Broad and Grace, \$136.40; \*William Kelly, Jr., portions of east side of 28th St., between Broad and Marshall, \$384.40.

**Charleston, W. Va.**—\*Central Engineering Co., about \$1.80 per sq. yd. for paving Columbia and Indiana Ave.

**Wellsburg, W. Va.**—\*Hamilton Construction Co., Philadelphia, Pa., secured contract let by Brooke county court for brick road, about \$223,000.

**Elkhorn, Wis.**—Paving will be done by the Western Improvement Co., of Racine, of which J. O. Jones is president, according to the decision of the council; was the lowest bidder. The formal contract has not been let. Accurate estimates made by the city engineer are about 45,436 sq. yds. of paving to be done. About 22,457 lin. ft. of curb and gutter will be required; 23,000 cu. yds. of excavating; 1,082 ft. of protection curb; 25,000 lin. ft. of 4-in. drain pipe; and in addition to the above, several thousand feet of larger sized sewer pipe laid as made by the Western Improvement Co., as follows: Excavation, per cu. yd., 20c; concrete curb and gutter, not integral, per lin. ft., 50c; integral, 30c; protection curb, 20c; sheet asphalt on a 5-in. concrete base, \$1.50 per sq. yd.; bitulithic pavement on a 5-in. concrete base, \$1.84 per sq. yd.; catch basins, \$30 each; manholes, each \$30; catch basin inlets, \$15 each; prices for drain and sewer pipe are quoted per lineal foot, laid as follows: 4-in. drain tile, 20c; 8-in. sewer pipe, 40c; 10-in. sewer pipe, 60c; 12-in. sewer pipe, 75c; 14-in. sewer pipe, \$1; 18-in. sewer pipe, \$1.50; 20-in. sewer pipe, \$1.50; 24-in. sewer pipe, \$2; overhead, per cu. yd. for each 100 ft., 2c.

**Harwick Twp., Ont.**—Contract awarded by the Township Council to \*C. Crosby, Skane St., Chatham, Ont., for the construction of sidewalks.

**Sarnia, Ont.**—Contract for the construction of sidewalks during the remainder of the year awarded by the town council to \*Gutteridge & Grace, 109 College Ave.

**Toronto, Ont.**—Contract for the construction of bitulithic pavement on Ossler Ave. has been transferred from R. C. Harris, commissioner of works, to the Warren Bituminous Paving Co., of Ontario, Ltd., McKinnon Bldg., at \$11,089.04.

## SEWERAGE

**Los Angeles, Cal.**—Ordinance ordering a sewer to be constructed in Echo Park Ave., between Lagun Ave. and Bellevue Ave.

**Cairo, Ga.**—The election that was to have been held Oct. 31 to vote on issuing \$28,000 sewer system bonds, has been changed to Nov. 28.

**Tennille, Ga.**—See "Water Supply." **Wilmington, Ill.**—City officials are making estimates of the total cost of fully equipping the municipality with complete sanitary and storm water drainage, in addition to the water main extension. It is estimated will be in the neighborhood of \$100,000.

**South Bend, Ind.**—Petition asking a sewer and water main be installed on Studebaker St. from Homewood Ave. to Linden St., referred to City Engineer Charles Cole and Superintendent A. P. Klein.

**Winchester, Ind.**—James W. McFadden of Union City, Ind., will construct a public drain for Randolph county at a cost of \$985.

**Butterton, Md.**—City plans sewers and disposal plant, Kastenhuber & Anderson, Engrs., Dover St., Easton.

**Beverly, Mass.**—An appropriation of \$500 for a sewer on Sargent Ave., and \$2,000 for a sewer on Pratt Ave. Both were referred to the finance committee.

**Bay City, Mich.**—Resolution that the city comptroller be instructed to advertise for bids on a 12-in. socket tile sewer in the center line of Williams St., beginning at Fisher Ave. and running north and connecting with the Jenny St. sewer, referred to board of public works.

**Grand Rapids, Mich.**—Trunk sewer in the Oakdale district, for the extension of which the Oakdale Improvement Association petitioned, has been approved by the board of public works. Will extend from Madison Ave. to Kalamazoo Ave. and to Oakhill.

**Sault Ste. Marie, Mich.**—City engineer instructed to prepare plans and specifications for new sewer systems on Portage Ave., between Douglas and Magazine St.; Magazine St. from Portage Ave. to Ridge St., and on Ashmun St. from Water St. to the water power canal, and submit the same to the council, carried.

**Duluth, Minn.**—Sanitary sewers were ordered in Sixth Alley, from Third to Fifth Ave. west; in Sixth Alley, from Raleigh to Sherburne St., and in 101st Ave. west, from the north line of Gary, First Division, to Rels St.

**Elizabeth, N. J.**—Petitions of property owners in Grlier Ave., requesting the installation of catch basins at the southeast and southwest corners of Garden St.; also Myrtle St., from Mack St. to Trenton Ave., be graded, curbed and flagged.

**Passaic, N. J.**—An ordinance for the construction of a sanitary sewer in Brook Ave.

**Rahway, N. J.**—Board of Health announced a sewer to be built in East Milton Ave., between Main St. and the drawbridge.

**Stoneharbor, N. J.**—An election resulted in favor of issuing sewer bonds to the amount of \$37,000.

**Utica, N. Y.**—City Engr. Kemper reported that tax maps would be needed for the new 16th Ward and topographical surveys would have to be made in order that sewers can be laid. The committee on finance is to confer with the city engineer in regard to the matter.

**Beaufort, N. C.**—See "Water Supply."

**Amherst, O.**—Council is about to take up the matter of constructing sanitary sewers in W. Martin Ave. and on the West Side.

**Cleveland, O.**—See "Water Supply."

**Elyria, O.**—Sewerage disposal and garbage reduction plant is advertised. Resolution by Councilman Casper Jones instructs city engineer to prepare estimates.

**Fremont, O.**—Resolutions authorizing the preparation of plans for the construction of 18-in. sewer in South St. has passed council. Also to construct and install a 6-in. water main, with the necessary fire plugs, extending from the present terminus through McKinley Pkwy.

**Lorain, O.**—The plans of Service Director A. J. Horn, for constructing a sanitary sewer in 12th St., have been recommended. The sewer will drain subways under the Nickel Plate right of way at Broadway and Long Ave.

**Salem, O.**—Council has placed report of City Engineer D. M. French on the

cost of putting the sewerage disposal plant in shape at a cost of \$71,500 on the without action. Filter beds will cost \$8,000; sludge beds, \$6,000, and a third settling tank, \$4,000, and the elevator pit will have to be lowered.

**Erie, Pa.**—Council passed an ordinance providing for construction of a sanitary sewer in 31st St. from Plum St. 250 ft. east.

**Erie, Pa.**—See "Streets and Roads."

**Harrisburg, Pa.**—Among the permits and decrees issued by the Pennsylvania Department of Health relative to water works and sewerage during the period from Oct. 1 to Oct. 31, 1916, inclusive, were: Bridgeville—approving proposed sewer extensions. Lower Allen township, Cumberland county (Elkwood Sewerage Co.)—approving proposed sewer extensions. Pittsburgh—approving proposed sewer in Nine Mile Run drainage district. East Whiteland township, Chester county (Villa Maria Academy)—sewage treatment. Philadelphia—approving lateral sewer extensions.

**Benton, Tenn.**—See "Water Supply."

**Fairmont, W. Va.**—City votes Dec. 15 on bonds for storm and sanitary sewers. S. B. Miller, City Engr.

**Chilton, Wis.**—See "Water Supply."

**Cobalt, Ont.**—The town sewer will be extended about 1,900 ft. Clerk, R. L. O'Gorman.

**Peterboro, Ont.**—City council intends to construct a sewer on Chamberlain St., from Park St. to Alfred St. at a cost of \$3,566.33. City Engineer, R. H. Parsons.

#### BIDS RECEIVED AND CONTRACTS AWARDED.

(\* Indicates Contracts Awarded.)

**Sacramento, Cal.**—\*W. J. Tobin secured contract for following work: Alley between Allen Ave. and V St., from the east line of T St. Addition to the west line of 34th St., be improved by constructing 8-in. vitrified ironstone pipe sewer; 2 concrete manholes, complete with cast iron curbs and covers; placing 26-in. vitrified ironstone Y branches on 8-in. pipe sewer, and doing all necessary excavating and backfilling of trenches.

**Sacramento, Cal.**—\*Joe Lawrence secured contract for sewer on Fourth and Fifth Aves. from the Lower Stockton road to East Ave.

**Bridgeport, Conn.**—Contract for the construction of the Holland Ave. sewer has been awarded to the \*Pierce Mfg. Co.

**Waterbury, Conn.**—Three bids for putting in sewers on the Meriden road, Eastwood Ave., Highland Ave. and Plank road were received but as the lowest bidder, the Henry Spinach Contracting Co., already holds a city contract, on which it is a month behind, action on the acceptance of a bid was deferred until the next meeting.

**Bloomington, Ill.**—\*A. Birt and \*J. P. McGarry of Decatur, Ill., secured contract let by University of Illinois for bridge; about \$7,977.

**Springfield, Ill.**—\*Henry Nelch & Son awarded the contract by the city board for building three strips of sewer work in the northeast section of the city, part of which lies in Springfield township, for the following work: Sangamon Ave. from a point 250 ft. east of 11th St. to 10th St.; 16th, 17th and 19th Sts. from Sangamon Ave. south for a distance of 1,340 ft., figures which were 83 cts. a lin. ft. for pipe and \$23 for manholes.

**South Bend, Ind.**—\*Reesh & Carter received the contract for installing a sewer in an alley between lots 8, 9, 10 and 11 in the Battell second park addition.

**Boston, Mass.**—Mayor approved a contract with \*Antony Cefalo, 220 Devonshire St., at \$1,399, for pipe sewers and drains in Jeffries and Sumner Sts., from Marginal St. to 250 ft. east of Jeffries St., East Boston. Bids for the work, opened Oct. 13, were as follows: Anthony Barufaldi, \$1,865; Frank Drinkwater, \$2,400; V. Grande, \$2,675.50.

**Bay City, Mich.**—For constructing a 12-in. socket tile sewer in center of Long St. beginning at east gutter line of Frank St., running east and connecting with Bangor St. sewer. \*Thos. Kent & Co., at \$189; also for 12-in. socket tile sewer in alley of block 8, Backus addition, at \$421.

**Bay City, Mich.**—\*I. A. Seder, at \$1,699, secured contract for 12-in. socket tile sewer in west gutter line of William St., north line of Fisher Ave., running north,

connecting with sewer north line of Thomas St.

**Detroit, Mich.**—Comr. Fenkel has entered into contract for the following lateral sewers: In alley between Lumley, Springwells, Michigan and the north line of lot No. 1, Alice Quinn, sub., \*Thomas G. Whittaker, \$269; between Russell, Grand Trunk, Caniff and Sloman, \*Joseph M. Affeld, \$588; between Central, Dix, M. C. R. R. and Casper, \*Joseph M. Affeld, \$1,211; between McClellan, Cooper, Blair and Chapin, \*Thomas G. Whittaker, \$1,078; between Florida, Proctor, Herbert and Panama \*Thomas G. Whittaker, \$1,402; between Central, Florida, Herbert and Panama, \*Thomas G. Whittaker, \$1,085; between Florida, Proctor, Michigan and Herbert, \*Thomas G. Whittaker, \$464.

**Jersey City, N. J.**—City let contract repairing 13th St. viaduct to \*Olmer Iron Works, Hoboken; about \$35,000.

**Greenfield, O.**—Council has awarded to \*H. E. Miller, of Columbus, contract for the construction of sanitary sewers. Plans are by A. Elliott Kimberly, 8 E. Long St., Columbus, O.

**Sebring, O.**—The contract for building the 19th St. sewer has been awarded to \*W. W. Watson.

**Springfield, O.**—\*P. J. Gaffrey awarded contract for Rose St. sewer, about \$9,296.

**Toledo, O.**—\*G. A. Gessner Co. was the lowest bidder on a sewer to be constructed in Homeville, new West Toledo addition. Bid was \$40,830.65. Others were the Toledo Construction Co., \$59,228.20; Thomas J. Kelly, \$47,426.32; Jas. Sheehan, \$42,372.19; J. N. Bick, \$43,002.35; Harris & Tansey, \$52,615.49.

**Copperhill, Tenn.**—City let contract for sewers to \*A. C. Brooks, Birmingham.

#### WATER SUPPLY

**Arkansas City, Ark.**—Lambe & DeMarke Light & Water Co. will install light and water plant, oil engine and 100 K.W. electric unit, and will erect a building 37 ft. long and 26 ft. wide. J. DeMarke, Manager.

**Berkeley, Cal.**—Municipal owned water supply is considered by City Council. People's Water Co. plant may be bought. City Attorney B. D. M. Greene instructed to investigate procedure necessary to acquisition.

**Rio Vista, Cal.**—A \$10,000 bond election to improve the municipal water system is being considered.

**Washington, D. C.** (Bureau of Foreign and Domestic Commerce, Department of Commerce).—A drainage engineer in India desires specifications, etc., on cast-iron water pipes and fittings and steel rods for reinforced concrete work. A contract will shortly be placed by one of the native States for 8,000 tons of cast-iron pipes. Refer to Opportunity No. 22886.

**Jonesboro, Ga.**—The city council approved resolution providing for construction of reservoir for water works plant. W. S. Archer, Mayor.

**Tennille, Ga.**—An election will be held Nov. 23 to vote the following improvement bonds: Water works, \$17,000; sewer, \$8,000.

**Chicago, Ill.**—Sealed bids will be received by the city of Chicago, at room 406, City Hall, for furnishing and delivering to the city of Chicago on certain streets in the city of Chicago as ordered approximately 8,125 tons of cast iron water pipe, 16, 24, 30 and 48 ins. in diameter, according to plans and specifications on file in the office of the department of public works. Address W. R. Moorehouse, Commissioner of Public Works.

**Quincy, Ill.**—Plans are being prepared for a pumping plant at the head of the Quincy Bay, to cost \$85,900. Engineer W. P. Bushnell has been authorized by the commissioners to prepare plans.

**Iowa Falls, Ia.**—The city contemplates the installation of a reservoir, pump house and installation of electric motors or oil engines for power. Address City Clerk.

**Soldier, Ill.**—Special election will be called to vote on issuing bonds for extension of water works system. Address Town Clerk.

**Chicopee, Mass.**—The city council has passed an order which provides for the

issuance of water main bonds to the amount of \$12,000.

**Bay City, Mich.**—Resolution that a water pipe be ordered laid in 17th St. from Madison Ave. to Jefferson St., referred to water works committee.

**Otsego, Mich.**—Water works improvement to cost \$30,000. Engineer, A. H. Smith, Toledo, O. C. M. Taylor, Mayor, will take bids soon. Bonds have not been sold. The improvements include one 100-ft. steel tower, one 150,000-gallon steel storage tank, concrete well 18 ft. deep, 30 ins. diameter, cast water mains, etc.

**Cambridge, Minn.**—Election will be held to vote bond issue of \$15,000 for improving water works system. Erick Lindahl, Clerk.

**Duluth, Minn.**—A gas and water extension was ordered in 97th Ave. West, from Crestline court to the south line of lot 10, block 12, Norton's Steel Plant division.

**Hinsdale, Mont.**—Water works, a sewage plant and adequate fire fighting apparatus are assured this town as a result of action taken by the Valley county board of commissioners in granting a petition of the taxpayers.

**Troy, Mont.**—Bid received Nov. 15, at 8 p. m., water bonds, of \$13,300.

**Herkimer, N. Y.**—Election resulted in favor of issuing water supply bonds to the amount of \$350,000.

**Niagara Falls, N. Y.**—City council voted to extend the water main in Sugar St. from Lafayette to Garfield Sts. The estimated cost is \$1,000. City Manager Carr asked that the city manager be authorized to order the pipe and receive proposals for performing the work. Request was granted.

**Beaufort, N. C.**—Bids received 8 p. m., Nov. 22, for purchase of \$100,000 water, sewer and street bonds.

**Alliance, O.**—Filtration plant to cost \$120,000, on North Walnut St. Engineers, Chester & Fleming, Union Bank Bldg., Pittsburgh, Pa. J. H. McConnel, Service Director. Will advertise for bids sometime in November.

**Canton, O.**—Service Director McClaskey states that a test well will be put down on the 114 acres of land under option 4 miles southeast of the city and if sufficient water is found the land will be purchased, more wells put down and a pumping station erected to force the water into the city. The land includes a reservoir site.

**Cleveland, O.**—B. W. Willard, engineer of the village of Shaker Heights, has plans at his office, 804 Marshall Bldg., for the improvement of North Moreland road from Fairmount road to North Woodland road, by constructing 6-in. and 8-in. water mains therein. Also for the construction of storm and sanitary sewers in North Moreland Blvd. for grading, paving same with brick, concrete, asphalt or bituminous macadam and for similar improvement of Warwick road and Kemper road.

**Dayton, O.**—Estabrook & Co., Boston, were high bidders on the \$70,000 worth of waterworks extension bonds, and also on \$100,500 worth of sinking fund bonds, which were sold in the office of Finance Director Wall, the premium on the first being \$3,948, and on the latter \$4,713.14.

**Deer Park, O.**—See "Streets and Roads."

**Defiance, O.**—The deed for the transfer of the property of the Defiance Water Co. to the city has been prepared by Victor Mansfield, city solicitor. It provides for the transfer in consideration of the payment of \$125,000. In order that paved streets may not be torn up, council has decided to install water service pipes on Jackson, 3d, 1st and Juliet Sts.

**Fremont, O.**—See "Sewerage."

**Hamilton, O.**—Council has passed under suspension of rules legislation for the improvement of the gas, electric and water systems of this city, at an approximate cost of \$12,000. Service director will immediately purchase the necessary supplies for the extension of the electric system. Ordinance providing for the extension of the water system includes the laying of new mains, the improving of the old one, together with the necessary equipment. Will purchase 7,200 ft. pipe and necessary fittings.

**Kent, O.**—The Solicitor has been authorized to prepare a franchise to the Kent Water & Light Co. for a period of two years.

**Ravenna, O.**—Filtration plant and water works improvements to cost \$125,000. Engineer S. E. Horsfall, Engrs. desires data on wood pipe. Working

drawings will be completed about Nov. 15.

**Yale, Okla.**—The question of issuing water bonds will be submitted to vote. Address G. C. Dale, President of Board.

**Astoria, Ore.**—At the December election this city will vote on the question of issuing reservoir bonds to the amount of \$125,000.

**Fleetwood, Pa.**—A proposition to issue water bonds to the amount of \$4,000 will be submitted to the voters at the November election.

**Harrisburg, Pa.**—Among the permits and decrees issued by the Pennsylvania Department of Health relative to waterworks and sewerage during the period from October 1 to 31, 1916, inclusive, was: Reading (Angelica Water & Ice Co.), approving plans for temporary treatment with chemical germicide.

**Nescopeck, Pa.**—The council is not satisfied with the water supply furnished by the Nescopeck Water Supply Co. A municipal system may be established. Address Borough Clerk.

**Westfield, Pa.**—Plans are being prepared for a \$58,000 sewer system. Address Engineer Wm. C. Emigh.

**Benton, Tenn.**—\$10,000 in bonds to provide water works, together with some sewers, the proposition carried.

**Chilton, Wis.**—Plans are in progress for municipal water works and sewer system, to install complete distribution system, including piping, hydrants and valves, elevated steel tank, pumping station. Address Engineer Jerry Donahue, York Bldg., Sheboygan, Wis.

#### BIDS RECEIVED AND CONTRACTS AWARDED.

(\* Indicates Contracts Awarded.)

**Los Angeles, Cal.**—Contract approved between the city and the \*People's Water Co., of Palms, for installing fire hydrants and furnishing water for fire purposes in the Palms and Culver City districts.

**Concordia, Kan.**—For building water works new pump house contract let to \*Scott Brothers at \$2,017.

**Boston, Mass.**—Oct. 27 the Mayor approved a contract with \*James Bartlett at \$2,442 for laying water pipes in Blue Hill Ave., Courtland Rd., Estella St., Greendale and Goodale Rds., Lucerne and Seminole Sts., Dorchester; Colon St. and Hunnewell Ave., Brighton. Bids for the work, opened Oct. 13, were as follows: John Guarino & Son, \$2,700; V. Grande, \$2,877.30.

**Duluth, Minn.**—\*Simon Johnson was awarded the contract to lay water mains in 99th Ave. West, from Dickson to Reis St.; in 102d Ave. West, from House to McGonagle St., and in 96th Ave. West, from Hurd St. to a point 257 feet north, on his bid of \$920.

**Duluth, Minn.**—Riback & Parvi would be unable to complete the laying of gas and water mains in Princeton place, from Kenilworth Ave. to a point 180 ft. south, by Dec. 1, so the commissioners rejected all former bids and awarded the contract to \*A. Hedenberg at \$657.

**Duluth, Minn.**—\*R. D. Wood & Co. were awarded the contract to furnish the water and light department with 36-in. specials on their bid of \$2,019.30.

**Ironton, O.**—Bids for the construction of section 1 of the new water works plant were opened by Director of Service Ridgeway. Contract awarded to \*Bessidero & Sattler, of Rochester, N. Y., who bid \$65,000 for the intake and pumping station as provided for in the specifications and \$63,500 with a concrete pumping well.

**Norfolk, Va.**—Board of control awarded contract to \*Burke & Gregory, Inc., to furnish the department of water with meter, reading sheets, record cards, etc.

**Hespeler, Ont.**—Contract awarded by the Town Council to \*James McDonnell, Gadshill, Ont., for the construction of waterworks extensions.

**Toronto, Ont.**—Contract awarded by the Board of Control to the \*National Iron Works, Ltd., Cherry St., for the supply of 108 lengths of 20-in. c. i. water pipe, at \$5,820 per length.

**Toronto, Ont.**—Bd. of Control awarded contract to \*M. H. Murphy, at \$2,610.20, for the laying and joining, etc., of 20-in. water pipes with connections.

**Toronto, Ont.**—Contract awarded by the Board of Control to \*Drummond, McCall & Co., Ltd., 373 Front St. E., for the supply and delivery of three Ludlow and three Blakeboro valves for water main service, at \$181 each.

#### MISCELLANEOUS.

**Balboa, Cal.**—An election resulted in favor of issuing Harbor Improvement bonds; \$125,000.

**Washington, D. C.**—Committee on parks and parkways was instructed to communicate with office of public building in regards to having park on Potomac Ave. improved.

**Washington, D. C.**—Bureau of Foreign and Domestic Commerce, Department of Commerce.—A trade extension bureau in Spain desires to secure for one of its correspondents catalogues, in Spanish if possible, of machinery for pulling up stumps, light motors, ditch digging machinery, and wood working machinery. Correspondence should be in Spanish. Refer to Opportunity No. 22910.

**Jacksonville, Fla.**—Proposals for \$300,000 6 per cent 20-yr. bonds of Baldwin Drainage district will be received by the Bd. of Supervs. up to 12 o'clock noon, Nov. 15, 1916. Address J. G. Boyd, Pres., Consolidated Bldg., Jacksonville, Fla.

**St. Augustine, Fla.**—Architect Fred A. Hendrick, St. Augustine, will prepare plans and specifications for the restoration of the old Court House.

**Brazil, Ind.**—The council is about to take up the matter of building a crematory plant south of this city.

**Spencer, Ind.**—Bids received Nov. 16, 1916, at 2 p. m., by Auditor of Owen County, for sale \$11,079.03 drainage bonds, 5 per cent, ten years. S. M. Royer, Auditor.

**Mankato, Minn.**—Plans for the ostrich house at Sibley Park were accepted and placed on file. City Clerk Bates instructed to advertise for bids for the superstructure. City will build the foundation.

**Minneapolis, Minn.**—Purchase of a 10-acre tract for a playground at 39th St. and Park Ave. was recommended by the Playgrounds Committee of the Board of Park Comrs.

**Joplin, Mo.**—Mayor Hugh McIndol recommended to bring to a vote before spring several propositions, cost possibly \$300,000, new City Hall comfort station, new parks and improvement of new annex parks; ground for new city cemetery, more children's playgrounds, two viaducts, and white way for Main St.

**Ventnor City, N. J.**—City will receive bids Nov. 13; \$20,000 park improvement bonds.

**Troy, N. Y.**—Resolution that president of the common council appoint a committee of common council to investigate and confer with the owner or owners of the old Troy Hospital and report the advisability of purchasing the same for the conduct of a city hospital for the treatment of contagious diseases. Adopted unanimously.

**Canton, O.**—The United Engineering Co., of Chicago, and the Canton Fertilizer & Chemical Co. each submitted bids to build a plant to dispose of the garbage of this city. The former company offered to build the plant and dispose of the garbage at \$1.50 per ton. The city to furnish a site of three acres on which to erect the plant. The Canton company offers \$50 per month. The matter will be referred to council.

**Cleveland, O.**—Cleveland Railway Co. with Public Service Director Alex. Bernstein agreed to co-operate with the city in the establishment of garbage unloading stations and the hauling of garbage in tank cars over the tracks. The company may lease fifteen sites to the city for the establishment of stations and will work out a plan for night service from these to the B. & O. Railroad or to the railway line that is planned for East 71st St. from the city to Willow Station. Director Bernstein said the attitude of the company simplifies the city's problem and that the cost will be much lower than was originally estimated.

**Marion, O.**—A number of citizens have requested the State Board of Health to arrange for the removal of the disposal plant here to a location several miles south of where it now stands. The State Board will consider the request at its next regular meeting.

**Middletown, O.**—Middletown is to have a new \$100,000 Big Four freight depot and railroad yards near the center of the city and streets which never have been connected with their extensions in the East End will cross the Big Four tracks as the result of a conference between the City Commission and railroad officials.

**Lehigh, Okla.**—An election will be held

in the near future to vote on the question of issuing City Hall and Jail bonds to the amount of \$5,000.

**Klamath Falls, Ore.**—At the last meeting of the City Council it was decided that November 14 should be the date of the municipal election to vote on the \$300,000 bond issue to aid in the construction of the Strahorn railroads.

**Klamath Falls, Ore.**—Mayor C. B. Crisler withdraws veto on \$300,000 bond issue to aid the Strahorn Railroad; will be before the voters at a special election on Nov. 14.

**Portland, Ore.**—Comr. Daly, of the Dept. of Public Utilities, has filed a report to the Council recommending that the charter amendment adopted five years ago, authorizing the issuance of \$75,000 for the installation of a municipal garbage collection system, be submitted to the voters at the municipal election next June for amendment.

**Erie, Pa.**—City accept plans of Engr. G. E. A. Fairley of Baltimore for revision of the State St. conduit system, cost of \$25,000. City Electrician Crane was directed to prepare plans on which construction bids will be asked.

**Philadelphia, Pa.**—\$10,000,000 4 per cent bonds of the city will be awarded to a syndicate of bankers headed by Drexel & Co., at 102.101.

**Steleton, Pa.**—The loan passed by the voters provides funds for the purchase of automobile apparatus for the collection of carbage.

**Fort Worth, Tex.**—Recreation Superintendent Vail urges bond issue for upkeep of parks.

**Richmond, Va.**—Business men are contemplating the construction of an electric railway line. The proposed route, a distance of approximately 7 miles, extends from Forest Hill to the Belt Line and through the woods, not along the road, thence across country to Bon Air. According to the tentative plans the line will obtain power from the Virginia Railway & Power Co.

#### BIDS RECEIVED AND CONTRACTS AWARDED.

(\*Indicates Contracts Awarded.)

**Fresno, Cal.**—E. H. Chapin, Supt. of Streets, ordered 2,206 new street signs from the A. L. Young Machinery Co. of San Francisco. More than 200 will be attached to electric standards. Special metal posts will be erected for the others.

**Los Angeles, Cal.**—Bids for 5,000 barrels cement and motor cars for the police department received and referred to the Supply Committee.

**Pensacola, Fla.**—The contract for removal of garbage was awarded to Loney Fillingham at \$500 per month.

**Waltham, Mass.**—The contract for the police auto patrol was signed by Mayor Eben J. Williams. Award to the \*General Motors Co.; price, \$2,000.

**Newark, N. J.**—Bids received for a new police headquarters by the common council building committee exceeded the estimates on which a bond issue of \$160,000 had been made; probably will be necessary either to get a larger appropriation or reject the bids and re-advertise. Total for low, \$185,157. Were 23 bidders. On the main work, consisting of masonry, steel and iron, Essex Construction Co., \$117,990. The other on this kind of work alone, New Jersey Cement Construction Co., \$120,540. E. M. Waldron & Co., Inc. and William G. Sharwell & Co. each made combined on the masonry, steel and iron work and the carpentry work. The Waldron combination, \$153,335; Sharwell Co., \$139,000.

**Albany, N. Y.**—The Empire Trust Co. of New York paid 101.85 for the whole issue of \$363,000 4 per cent registered non-taxable bonds of the city; nets a premium of \$6,715.50. Sold by City Comptroller John M. Foll. Albany Trust Co. second highest amount; willing to take the whole issue for 101.68. Bache & Co., 101.50, and Esterbrook & Co., of New York, 101.32. One hundred thousand of the amount is in grade crossing bonds; \$75,000 in general resurfacing bonds, and the remainder are for public improvements.

**Ashland, O.**—\*J. A. Roberts of city the low bidder for improvement of Rush Creek in Fairfield and Perry Counties. County Surveyor Clarence Brown of Lancaster estimated the work at \$105,000.

**Galveston, Tex.**—The bid of the \*Galveston Motor Car Co., \$900 and the old battery, was accepted for a new battery to be installed on one of the city's street sprinklers.